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AMERICAN JOURNAL OF OPHTHALMOLOGY
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THE TREATMENT OF NONPARALYTIC SQUINT*

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PHILADELPHIA

Early treatment is essential, whether surgical or nonsurgical, the best results being obtained before the child reaches the sixth year of life. Surgical intervention is discussed, and the method suited to the type of complaint after refraction and treatment for amblyopia have done what they could to bring about full correction. Read by invitation at the Oxford Ophthalmological Congress, July, 1932, as the opening discussion in the symposium on the subject of squint. From the Department of Ophthalmology, Graduate School of Medicine, University of Pennsylvania.

The treatment of squint should begin when the diagnosis is made. In this, as in many other phases of concomitant squint, the older methods are in need of revision to keep in step with the march of progress during the last decade. True enough, those who are not in accord with the modern trend have some ground upon which to base objections to certain changes in the newer methods, because each step should not only be confirmed by the experience of a minority, but there should be a rather general acceptance of these facts. General acceptance is slowly gaining, and the time is ripe for a careful appraisal of each new fact, and the value of each new method of managing the several phases which I will discuss with you. There are, moreover, a number of unfortunate adults even now who furnish concrete evidence that our older methods, in too many instances, resulted in failures. They serve as living commentaries upon methods which but ten years ago were regarded as orthodox, but in retrospect are no longer tenable.

If our modern conception of squint, and the methods of meeting its several phases can be shown to yield a higher percentage of cures and a lower rate of failures, we will have made progress which will become more apparent during the next ten years. That such is the case will be the burden of this communication in opening the discussion on present-day methods of treatment and the results.

"The treatment of squint should begin when the diagnosis is made." This implies that the attending family physician should be informed as to the need for early treatment, so that the eye surgeon may see the case and advise the plan of procedure from its earliest appearance. In the first few months of life comparatively little can be done, but the facts and the family history can be gathered for future use. The hereditary strain, as to the presence of squint in other members of the family; its character, as to whether it is monolateral or alternating, convergent or divergent; the refractive errors of the parents when pronounced; and the presence of unilateral amblyopia with or without squint are all data which will serve a good purpose in the future management of any case in hand.

In outlining our plan of treatment, the cases may be divided into two broad groups: convergent and divergent. The former is the dominating type, divergent squint appearing less frequently, and as a rule much later in life. Each of these two main groups is subdivided into monolateral and alternating. In the time allotted for discussion, it may not be possible to cover each type fully. It is most important, therefore, to stress the prevailing form.

Monocular Esotropia

In a study of the etiologic factors, may I state as a working basis that a de-

* Published by kind permission of the Council of the Oxford Ophthalmological Congress.

fective fusion faculty forms the background with, first, high hyperopic refractive errors, usually unequal in the two eyes; second, hereditary influences; and third, precipitating causes, one or more of which help to make up the picture that may be found in most cases.

Time will not permit to give proof of the role which each of these alleged causes plays in the development of squint. Recent literature, however, is replete with evidence which tends to support our belief that the causes as stated are based on sound reasoning, and have received general acceptance.

In addition to a brief statement as to the etiology of squint, two other facts should be mentioned in our premise, as an aid to a better understanding of what is needed in treatment. These facts are, first, the two conspicuous barriers that stand in the way of perfect cures are a totally absent fusion faculty, and central amblyopia which is found in the squinting eye. The second fact is: *all phases of treatment yield the best results before the sixth year of life.* While this is not an arbitrary age, it serves as a guide for the young ophthalmologist. In many instances, all treatment can be completed before the sixth year; in others, good results may be obtained after this age, but for reasons which will be set forth, it is disastrous to delay treatment until the child is of school age.

With these facts clearly before us, the treatment of convergent squint may be discussed under, first, refraction; second, prevention and correction of amblyopia; third, training of the fusion faculty; fourth, surgery; and fifth, stereoscopic training. This is the chronologic order which seems to yield best results in most cases.

Refraction. By common consent refraction is regarded as the first and most important step. We differ perhaps only as to the age when it should be practiced, and as to the degree of ametropia which may require correction. One can obtain a fairly approximate estimate of the refractive error by means of the ophthalmoscope. When the error thus found is appreciable, one should proceed at once to its proper estimation under atropine cycloplegia. The child may be too young to be glassed, but if there is much difference in the refractive errors in the two eyes, the fight against amblyopia may be begun even in a child six months of age. It is a question of judgment as to how early glasses should be prescribed when three or four diopters of hyperopia are present. I have ordered them for children sixteen months old with entire satisfaction. Others have prescribed them for children much younger. A child of twelve to sixteen months begins to use its eyes freely, and quickly finds that glasses are not objectionable but helpful. In high hyperopia the rule is: a full correction should be prescribed at the earliest possible moment.

Throughout the period of treatment and after a cure is effected, a careful check-up should be made at least once a year, and great care should be observed in the total estimation of both spherical and cylindrical errors. Retinoscopy should be our guide until the child is old enough to help in the final choice of the lens at the trial case. A full, but not an overcorrection should be worn.

In this connection, the thoughtful student will raise several questions. In what time after wearing glasses can one look for results? Of what value are glasses, if the squint does not totally disappear? Why do not all cases respond, if hyperopia plays so important a role? In what number of cases does squint entirely disappear with the prescribing of glasses? These queries are all apropos.

In answer to the first question, glasses will usually accomplish a maximum degree of correction in a month's time in children two or more years of age. This may not apply to infants, because a child of two years or more is naturally more active and puts his eyes to greater use than a baby in arms. The response to glasses is very prompt in children of this age, and little improvement can be expected in the correction or reduction of the deviation beyond what is noted at the end of four to six weeks.

The second question, "Of what value

are glasses if the squint does not entirely disappear?" is one upon which the parents must be satisfied. They look for results and ask for reasons when they are not forthcoming. According to our present belief, refractive errors, especially when unequal, can precipitate squint only when fusion is weak. The wearing of glasses restores the accommodative balance, and tends to return the visual axes to parallelism. It does much more. With a diminution in the angle of the deviation, the fusion faculty may be strong enough to bridge the separation of the two images, one of which was suppressed, but now may become responsive with restored visual acuity. It is true, a complete restoration of parallelism may not always be possible without operation, for reasons which will be fully set forth, but the way is paved for future perfect results. To the experienced ophthalmic surgeon, each step in the correction of squint leads to certain definite ends, but complete cures are effected only by the systematic training previously outlined: refraction, visual acuity training, and fusion exercises. Refraction, therefore, in most instances must be supplemented by other measures. It is a common observation in cases of a strictly monocular type, if amblyopia has not developed, that the prescribing of glasses may change a monocular squint into one of an alternating type. Unless careful records are kept, both parents and physician may find it difficult to say to which eye the patient gives preference, if the habit has not become too deeply fixed before training is begun. Glasses, therefore, tend to lessen the danger of amblyopia.

"Why do not all cases respond to glasses if hyperopia plays so important a role?" There are four good reasons why glasses in themselves may not appreciably lessen the angle of squint. First, the deviation may be too wide to effect a noticeable correction. When squint develops, suppression of the image in the deviating eye is more readily accomplished if the images are widely separated. A wide deviation soon becomes a fixed quantity, and correction of the refractive error, therefore, may fail to lower the angle of deviation materially until other steps in treatment are added.

In the second place, after squint becomes fixed, organic and molecular changes are found in the contracted internus, and in the relaxed and stretched condition of the external rectus, capsule, and conjunctiva over this muscle. These anatomic changes may call for surgery even before the axes can be returned to their normal relation.

Amblyopia which follows from disuse of the squinting eye furnishes the third reason why glasses fail to yield maximum results. When the amblyopia disappears, corrective glasses increase in efficiency.

Finally, a good fusion faculty is necessary to aid in the correction of squint, and poor fusion is a barrier which interferes with all that glasses might otherwise accomplish.

The last question, "In what number of cases does squint entirely disappear with the prescribing and wearing of glasses?" can be answered more fully after we have covered the subjects of amblyopia and defective or absent fusion. It can be answered only in part at this time. In low degrees of squint, fifteen to eighteen degrees, if central vision is good, or can be made nearly equal in the two eyes, and fusion is not too weak, the visual axes are apt to return to parallelism in a majority of cases.

It is quite evident, therefore, that although refraction forms the basis of treatment in a number of cases, other factors, in many instances, are equally vital.

Amblyopia. This is a phase of monocular squint which is less understood and in a way more vital than any other symptom. When fusion is present, although defective, amblyopia is the most important phase of squint to receive attention, if genuine cures are to be obtained. Those of you who have given much thought and study to this symptom, or if you prefer the term "complication" of squint, will agree with me as to certain facts which have merited acceptance, and which, therefore, I will

not attempt to defend by further proof. They are:

1. Amblyopia does not occur in true alternating squint.

2. In all cases of monocular strabismus in which central vision is lowered in the squinting eye, a small central relative scotoma can be outlined.

3. The deviation and the central scotoma can be transferred from one eye to the other by forced occlusion of the fixing eye in children up to five or six years of age. The younger the child, the easier it is to transfer the squint and the lowered vision.

4. Amblyopia rarely develops after the seventh year.

5. If no effort is made in early childhood to correct amblyopia, it continues throughout life.*

Other facts with reference to amblyopia might be included in this group, but for the better understanding of methods of prevention and the cure of amblyopia, some discussion is in order.

The time required in young children at about the age of three years, for amblyopia to develop after squint becomes fixed, is brief. It is probable that it develops even more rapidly in infants, but it is difficult to prove excepting by a method which engages the squinting eye in fixation. The difficulty in fixation becomes especially apparent in the first days when an occlusive bandage is applied to the good eye. Even the young child rebels, and children between two-and-a-half and five years of age are equally awkward in their first movements, and a bit difficult to persuade in first attempts at occlusion. Experimentally, in a number of instances, the transfer of the squint and lowered vision occurs in from six to eight weeks. It is probable that lowered vision develops in shorter periods after the squint is established in young children.

The methods of preventing and of correcting amblyopia are two. Either atropine can be used in the fixing eye, or the fixing eye can be occluded for a time each day. Atropine is least satisfactory. It may be used in young children, but the glare of light is annoying, and prevents the child from obtaining its full share of sunshine, and in addition, it is unwise to intrust the proper carrying out of the procedure to the parents in the average home. In fact, it is partly through this method, which, in instances was carried on indefinitely without consulting the physician, that squint was shown to be transferable from one eye to the other.

An occlusive bandage is safer, more effective, and causes less annoyance to the child. A ground glass placed in the frame before the good eye is not so effective as complete occlusion for certain periods each day. The method is also followed by transfer of the squint and amblyopia. It is my practice to furnish a soft black-mesh bandage to patients. Tape or an elastic band is attached to the snugly fitting pad, and the inside is lined with soft gauze. The length of time it is to be worn each day depends upon conditions. If amblyopia has not developed, a two-hour session each day usually is sufficient to prevent deterioration of vision. After amblyopia has appeared, occlusion should be practiced for longer periods, according to the degree of visual loss. These periods vary from three to six hours daily. In its use, two phases need our closest attention; namely, first, a proper method of determining the visual acuity, and second, what shall be done by the patient during the time when the bandage is worn.

Visual acuity can only be approximately determined in the young child. One can observe whether it is handicapped in its childhood occupations. When compared with normal activities, or better still, if the eyes are bandaged alternately, one can draw pretty fair conclusions as to the visual acuity of the squinting eye. The use of small objects, as recommended by Worth, also aids materially in arriving at satisfactory conclusions for the time being. I find the average mother's observations of most value as to the conduct of the child during the bandaged period. At two-and-a-half years, one can begin to obtain more dependable evidence. There

* Peter, L. C. Amblyopia ex anopsia in adult life. Amer. Jour. Ophth. v. 15, no. 6, pp. 493-498.

are many kindergarten charts which can be used in taking visual acuity. The one which I like best is the Reber test chart. In my private practice, the parents are instructed to purchase a chart. The objects are cut into squares and the child is instructed to play with them, and is taught their names. After they show familiarity with them, the mother is further instructed to try each object at varying distances, all of which prepares the little patient for the proper test in the office. Unless the child is shy or timid, one can begin to get dependable vision soon after two-and-a-half years. This is important, and every resource should be exhausted to obtain accurate knowledge of central visual acuity as early as possible.

The second phase of the management of amblyopia is of equal importance. "What shall the child do during the periods when the bandage is worn?" At the earliest moment possible, some definite occupation at the near point should be devised. The usual kindergarten methods are applicable before school age. Drawing, copying, painting, sewing, stringing of beads, cutting out of pictures, etc., are occupations familiar to all young children. When the child is of school age, the cooperation of the teacher is obtained, and the bandage is applied for a morning period, or the latter may be divided into a morning and an afternoon session. Writing and copying are of especial value. Samples of this work can be recorded and made part of the record at each visit to the office.

At the beginning of training, when fixation is difficult, such occupations naturally cannot be prescribed. During these earlier periods, the child can be left to its own devices until fixation is more perfect. This is a matter of but a few days, and the training can gradually be made more effective as the treatment progresses. The several points which I wish to stress are, first,

GROUP 1.—Up to 8 years, inclusive. Average age: 5½ years.

No.	Age	Vision	Correction	Improvement
1	7	6/12	+3.50 D.sph. ⊖ +0.25 cyl. axis 90° = 6/9 pt.	6/6
		6/7.5	+3.50 D.sph. ⊖ +0.25 cyl. axis 150° = 6/5	
2	7	6/30 + 1	+9.00 D.sph. ⊖ +1.00 cyl. axis 90° = 6/22	6/6 + 3
		6/9	+8.00 D.sph. ⊖ +1.50 cyl. axis 90° = 6/5	
3	6	6/5	+3.50 D.sph. ⊖ +0.50 cyl. axis 90° = 6/5	
		6/45	+3.00 D.sph. ⊖ +0.50 cyl. axis 90° = 6/22	6/12 No cooperation
4	4	6/60	+3.00 D.sph. ⊖ +0.37 cyl. axis 90° = 6/22	6/5
		6/30	+3.50 D.sph. = 6/5	
5	7		+2.00 D.sph. ⊖ +3.25 cyl. axis 130° = 6/15	6/7.5
			+1.75 D.sph. ⊖ +2.50 cyl. axis 75° = 6/7.5	
6	4	3/60	+4.25 D.sph. ⊖ +0.75 cyl. axis 90° = 6/15	6/4
		6/6	+4.25 D.sph. ⊖ +0.75 cyl. axis 90° = 6/4	6/4
7	5½	6/12	+4.25 D.sph. ⊖ +1.12 cyl. axis 90° = 6/4 pt.	
		6/45	+4.62 D.sph. ⊖ +1.75 cyl. axis 90° = 6/12	6/6
8	7	1/150	+7.00 D.sph. ⊖ +0.37 cyl. axis 135° = 6/12 — 2	6/6 pt.
		6/12	+4.25 D.sph. ⊖ +0.87 cyl. axis 90° = 6/5	
9	4	6/15	+4.00 D.sph. ⊖ +1.25 cyl. axis 105° = 6/9	6/4
		6/12	+4.00 D.sph. ⊖ +1.25 cyl. axis 90° = 6/5	
10	3		+2.00 D.sph. ⊖ +1.00 cyl. axis 60° = 6/4	
			+2.00 D.sph. ⊖ +1.00 cyl. axis 135° = 6/7.5	6/6
11	8	6/15	+2.62 D.sph. ⊖ +2.12 cyl. axis 90° = 6/5	
		6/15	+3.12 D.sph. ⊖ +2.12 cyl. axis 90° = 6/6 pt.	6/5 +
12	5	6/7.5	+5.50 D.sph. ⊖ +0.37 cyl. axis 90° = 6/4	
		6/15	+5.50 D.sph. ⊖ +0.37 cyl. axis 90° = 6/14	6/6
13	2½		+1.00 D.sph. ⊖ +2.25 cyl. axis 90° = 6/9 pt.	6/6 pt.
			+1.25 D.sph. ⊖ +1.00 cyl. axis 90° = 6/5 pt.	

occupation at the near point, requiring precision, is of much greater value than simple occlusion at play. Second, the entire training must be planned and entered into by the parents, who can be aroused to help in a fight which may mean either good vision in both eyes, or central amblyopia in one eye for life, with all its handicaps.

Furthermore, it means that the physician himself must possess the proper enthusiasm to be able to impart enthusiasm to the parents. Just what can be accomplished will surpise even the most skeptical. As I previously stated, every phase of the treatment of squint accomplishes much more in the first five or six years of life than later. This applies especially to amblyopia. It can be corrected even in adolescence in some cases, but it yields less readily and more imperfectly after the seventh year of life. The reason for this is obvious. Amblyopia rarely if ever develops after the seventh year in any form of squint. For the same reason (perfectly formed and developed maculae), amblyopia and squint cannot be transferred from one eye to the other after the seventh year. It is during the formative period of childhood that the maculae can be so definitely influenced.

To those who have not entered whole-heartedly into the possibilities of correcting this form of amblyopia, and who are still inclined to believe that the amblyopia of squint is congenital and not acquired, this claim of restoring full vision in the young child may seem to be questionable, or at least too optimistic.

The following list of cases is submitted for study. This list could be much enlarged. There is a sufficient number, however, to show that amblyopia can be corrected.

In a limited number of cases, the two measures discussed may be sufficient to bring about perfect cures. The exact percentage of real cures, with restoration of single binocular vision, can only be determined by the gathering of statistics from many investigators. The cases should be limited to children under seven years of age, and the squint should not exceed twenty degrees of deviation. On this basis, I would estimate my own results as easily fifty percent. When the deviation is twenty-five degrees or more, other measures as a rule must be added to bring about cures. If treatment is begun after the sixth year, even with other measures added, real cures are more difficult to obtain. Insofar as amblyopia alone is concerned, proper treatment before the age of six can restore central visual acuity in the great majority of cases.

GROUP 2.—9 to 12 years, inclusive. Average age: 11 years.

No.	Age	Vision	Correction	Improvement
1	12	6/5	+1.50 D.sph. ⊖ +1.00 cyl. axis 45° = 6/5	
		3/150	+1.50 D.sph. ⊖ +1.00 cyl. axis 135° = 3/150	6/9 pt.
2	11	6/30	+2.50 D.sph. ⊖ +1.00 cyl. axis 105° = 6/12	6/5 — 2
		6/5	+1.25 D.sph. ⊖ +0.50 cyl. axis 90° = 6/5	
3	11	6/6	+0.87 D.sph. ⊖ +0.25 cyl. axis 90° = 6/5	
		6/9 pt.	+0.87 D.sph. ⊖ +0.50 cyl. axis 120° = 6/9	6/5 pt.
4	11		+3.25 D.sph. ⊖ +1.00 cyl. axis 105° = 6/12	6/7.5
			+2.00 D.sph. ⊖ +0.50 cyl. axis 90° = 6/5	
5	9	6/7.5 pt.	+5.75 D.sph. ⊖ +0.75 cyl. axis 90° = 6/6	
		6/30	+5.00 D.sph. ⊖ +2.25 cyl. axis 80° = 6/30	6/12
6	11	6/30	+2.50 D.sph. ⊖ +1.37 cyl. axis 105° = 6/12	6/5 pt.
		6/5 pt.	+1.25 D.sph. ⊖ +0.62 cyl. axis 90° = 6/5 pt.	6/5 pt.
7	11	6/6 pt.	+0.25 D.sph. ⊖ +0.25 cyl. axis 90° = 6/5	
		6/7.5 pt.	+0.25 D.sph. ⊖ +0.75 cyl. axis 110° = 6/7.5 pt.	6/5 — 1

Training of the fusion faculty. The third measure to engage our attention is training of the fusion faculty. From a diagnostic standpoint, it is important to know as early as possible whether fusion is totally absent or is present

but defective. The former condition occurs only in true alternating squint, the latter is observed in monolateral esotropia. If fusion is present even in moderate degree, it can be awakened, and may add sufficient to the first and second measures to restore single binocular vision without operation. More often fusion training in squint of twenty-five degrees or more acts only as a means to an end, insofar as it insures more perfect results after operation.

During the last few years, I have found it better to place the important part of this training fourth in order, electing to operate preferably between the ages of three and four years, when squint is thirty or more degrees. The reasons for placing operative procedures third will be more fully set forth under our discussion of surgical treatment. If one can satisfy himself that fusion is present even in second degree, according to Claude Worth's classification, it does no harm to postpone this training in all seriousness until the fourth year and even later, if the child shows little inclination to enter into the game, for such it is. In fact, the self-awakening of fusion after refraction and amblyopic training, and especially after early operation, is one of the surprising results which I have had the opportunity of observing after the axes are brought close enough by previous treatment, which may or may not include operation, to enable fusion to bridge the separation of the images. In many of these cases, little artificial stimulation of fusion becomes necessary.

In some instances, fusion training is very simple indeed. In other instances, it is more difficult. So long as the angle of deviation is twenty degrees or more, the amblyoscope, or one of its modifi-

GROUP 3.—13 to 21 years, inclusive. Average age: 17½ years.

No.	Age	Vision	Correction	Improvement
1	19	6/15	+3.25 D.sph. ⊖ +0.25 cyl. axis 105° = 6/15	6/5 + 2
		6/5	+3.50 D.sph. ⊖ +0.37 cyl. axis 90° = 6/5 + 2	
2	14	6/15	+1.75 D.sph. ⊖ +1.75 cyl. axis 90° = 6/12	6/9
		6/5	+1.25 D.sph. ⊖ +0.25 cyl. axis 90° = 6/4 pt.	
3	18		+3.50 D.sph. ⊖ +1.75 cyl. axis 15° = 6/15	6/5 + 3
			+0.50 D.sph. ⊖ +1.25 cyl. axis 142° = 6/4	
4	18	6/6 pt.	+1.25 D.sph. ⊖ +0.50 cyl. axis 90° = 6/5	
		6/22 — 2	+0.25 D.sph. ⊖ +2.25 cyl. axis 90° = 6/15	6/9 pt.
5	13	6/6 — 2	+1.37 D.sph. ⊖ +0.25 cyl. axis 15° = 6/5	
		6/15	+1.25 D.sph. ⊖ +0.37 cyl. axis 165° = 6/9	6/6
6	19	6/15	+2.00 D.sph. ⊖ +0.37 cyl. axis 97.5° = 6/9 pt.	6/6 + 2
		6/7.5	+0.50 D.sph. ⊖ +0.62 cyl. axis 120° = 6/5 pt.	
7	16½	6/12 pt.	+2.25 cyl. axis 30° = 6/7.5 pt.	6/4 pt.
		6/4 pt.	+1.25 D.sph. ⊖ +0.50 cyl. axis 90° = 6/4 pt.	
8	21	6/30	+3.50 D.sph. ⊖ +3.50 cyl. axis 95° = 6/15	6/7.5 pt.
		6/12 pt.	+3.75 D.sph. ⊖ +2.00 cyl. axis 87.5° = 6/5 pt.	
9	17	6/30	+0.87 D.sph. ⊖ +0.37 cyl. axis 90° = 6/22	6/12
		6/5 +	+0.62 D.sph. ⊖ +0.25 cyl. axis 90° = 6/5 + 3	
10	19	6/22	+1.00 D.sph. ⊖ +2.50 cyl. axis 95° = 6/7.5 pt.	6/5 — 2
		6/6 pt.	+1.75 D.sph. ⊖ +0.25 cyl. axis 90° = 6/5 +	

Summary of Groups 1, 2, and 3.

	Group 1.	Group 2.	Group 3.
Average age	5½ yrs.	11 yrs.	17½ yrs.
Average vision before training	6/15	6/14 excluding case 1	6/14
Average vision after training	6/6	6/7	6/7.5

cations, is the only instrument at our disposal. The instrument is quite satisfactory in classifying the state of the fusion faculty, and serves our purpose well for the moderate training required in the first three or four years. If the deviation is under twenty degrees, one of the various forms of the stereoscope can be used, and the squint can be mechanically corrected by means of loose prisms. The best form of charts for this period and for early training is found in the Wells series and the Hamblin charts. The latter are the best for the young child and for older children in their first tests. Drawing through the stereoscope, as in the form offered by the Keystone View Company, the American Optical Company, and the instruments which Maddox and others have designed, is also a great asset. This, however, covers a refinement in training which will be discussed under the head of stereoscopic treatment to be applied after operation in children five years of age or over, in whom the deviation is diminished by refraction and visual-acuity training, but in whom operation is required for its full correction.

Surgical treatment. Inasmuch as probably fifty percent of cases come to operation, largely because of inadequate training before the end of the fifth year, surgery forms an important chapter in the discussion of squint. I will not enter into the details of operations, but will discuss the important underlying principles which guide us as to the time when operations should be performed, and as to the character of the procedures. During the third year, an experienced surgeon can determine whether an operation will be necessary, or a cure can be effected by other measures. If training has been systematic, all that can be accomplished will be definitely known when the child is four years of age. Refraction and amblyopic training will show maximum results in from one to six months. After maximum results are obtained by training, nothing is gained and much valuable time is lost in postponing operation. At the age of four, the child is quite sensitive to the epithets and taunts to which it is exposed. Little heed is given to this phase of the case. It changes a child's outlook on its little life, and, as a rule, seriously affects its disposition and certainly its mental inclinations and disinclinations. Furthermore, if an operation becomes inevitable, why not perform it at a time when the results offer so much more than they do when the operation is performed at the age of seven to ten years or later, which we formerly thought was a suitable age? During the last few years, I have operated as soon after three as the parents could be persuaded, if all necessary training failed to bring the results. In cases of thirty-five degrees, or more, the parents are advised that the second eye will probably require an additional operation a year or two later. In these cases, I have been agreeably surprised to find a second operation unnecessary. What has happened? In older children and in adults, thirty-five degrees of squint usually call for a later operation on the fixing eye. In young children, an advancement and a recession suture usually reduce the deviation to an angle which fusion is able to bridge over, and in the course of a month, with even moderate fusion exercises, single binocular vision becomes established.

A third good reason for early operation is the fight which must be waged against amblyopia up to the seventh year, so long as squint exists. This reason alone is sufficient to make early operation worth while.

Finally, if surgical measures are practiced at this early age, single binocular vision is established even before the school period begins.

To be fair, one should include the reasons, if any, why operation may be postponed. In my experience, such reasons are few and rarely deter me from following my usual custom of operating early.

The protests of the parents furnish a valid cause for delay, but, as a rule, such objections can be overcome by frank discussion. They are influenced in most instances by the unfortunate dictum which even now prevails among the uninformed: "to give the child a chance to grow out of the squint." It

is true, in rare instances, squinting eyes have become cosmetically parallel. But in how many instances has this occurred? And in such instances how many have carried amblyopia and imperfect muscle balance through life as the result of such method of treatment?

A more valid reason might be the state of the child's health. An anesthesia of a half hour and confinement in a hospital for a week might be a sufficient cause in rare instances, but surely not as a rule.

A third reason advanced by those who do not operate early is a hope that eventually the eyes will become parallel, if the other measures are religiously practiced. This is a hope which I have not seen realized if it does not occur within a year of training, and there is too much at stake to follow such a course.

Finally, students have asked "Is there no danger of the eyes becoming exophoric and eventually exotropic, if the squint is corrected too early by operation?" This does not happen if the surgical technic is accurate and fusion is trained. Outward deviation will not occur after properly performed surgery. With the establishing of good fusion, the eyes will be held in perfect alignment thereafter. Any failure of fusion to hold can only be attributed to poor surgery and failure to awaken fusion.

What type of operation should be practiced? In this, there is reasonable ground for differences.

Uncontrolled tenotomies are no longer practiced by the discriminating surgeon. They are replaced by a form of recession suture. In moderate degrees of squint, a few operators prefer retroplacement of the internal rectus—a reattachment farther back on the sclera. A majority of operators, on the other hand, believe that it is better surgery to shorten the weak external rectus by one of the several operations at our disposal. You are all familiar with the difference between the condition of the external rectus and surrounding tissues, and that of the internus and its fascia. The latter muscle is contracted and taut, and the capsule is firm and elastic. The external rectus is relaxed, stretched and thinned out, and the overlying capsule is in the same condition. When the externus is raised on a hook, one is always impressed with the atrophic and relaxed state in which it is found. The muscle is lengthened and stretched manifestly to the extent of the degree of deviation. If the internal rectus, therefore, is not in a state of *contracture*, that is, organically shortened, it is better surgery to strengthen the weak and stretched external rectus by one of the operations at our command.

A second good reason for this choice, if another is needed, is the danger of weak convergence after a recession operation, if the muscle is receded more than five millimeters from its original attachment. This is of more than passing importance, because our modern methods not only aim to secure single binocular vision, but actually accomplish this end. In the interests of the future ability of the patient to sustain vision at the near point, therefore, a recession suture should be held in reserve as a supplementary operation, when more than one procedure becomes necessary. There are several exceptions to this rule, one of which is quite definite. If the internal rectus is organically shortened by contracture, in squint of long standing and of high degree, the recession suture comes to the front as the first and important operation, and shortening of the external rectus becomes supplementary. The other exception will be noted later on in our discussion.

The shortening operations at our disposal are four: first, resection; second, advancement; third, tucking; and fourth, the O'Connor cinch operation.

In squint of twelve-to-fifteen degrees, a resection is the best form of procedure. In this group, Worth's technic used in advancements is based on sound surgical principles, is effective, and is most satisfactory cosmetically, insofar as the local appearance of the conjunctiva and tissues is concerned. Resection of the muscle alone involves too much disturbance of the normal relation of the muscle, capsule, and conjunctiva, resulting in too much

scar tissue. Furthermore, the muscle, when reattached, *should be separated from the underlying sclera by capsule,* and in simple muscle resection, this is not the case.

If more than fifteen degrees of correction are necessary, an advancement will add at least five degrees of gain over a safe resection. To this gain of five degrees or more of shortening, should be added the advantage of reattaching the muscle tendon itself rather than muscle tissue. The tendon of the external rectus is 8.8 mm. long. A resection of a considerable part of this tendon can be practiced, and sufficient tendon will be left to be reattached to the sclera.

Any deviation beyond twenty degrees, and sometimes even less than twenty degrees, will need a supplementary procedure. In this matter, one has a choice between double advancements at separate sessions, and a recession suture on the opposing internus at the time when one external rectus is shortened. If two operations are needed in cases in which amblyopia is absent or can be corrected, *double advancements are better than an advancement and a recession,* but this entails two operations at an interval of about two weeks. Some parents object to this method of procedure. On the other hand, if care is observed in the recession operation, so as to preserve convergence, the operations may be limited to one eye, and can be performed under one anesthesia.

The role of tucking is debatable. It is popular largely because of the ease of its execution. Are the end results comparable to those of resections and advancements? In low degrees of deviation, the squint can be corrected by properly placed sutures, but the cosmetic results at the site of the tuck are not all that one could wish. The gross tumefactions, which follow the use of twenty-day chromic catgut, can be avoided by using ten-day catgut, but a certain amount of thickening will remain. It is my belief, therefore, that tucking should be used in the phorias and only in low degrees of squint. For example, seven or eight degrees of squint can be more precisely corrected by tucking than by a resection; but for ten or more degrees of correction, a resection should be practiced.

The O'Connor cinch operation is positive in its corrective power. The results are based on the creation of an inflammatory process which will insure permanent organization of the loops of tendon which are primarily held in place by strands of dermal. The sutures must remain twenty-one days during which the inflammatory reaction is great. In my experience, the method compares favorably with an advancement or resection insofar as definite results are concerned, but convalescence is protracted, and the reaction is severe. It is worth while in the shortening of the internal rectus in divergent squint, and, in some instances, in convergent strabismus, if the deviation is wide and the child is not too young.

In wide deviations, from thirty-five to forty degrees, a third procedure will be necessary. The natural sequence under such conditions would be an advancement and a recession on the squinting eye, and the necessary supplementary procedures on the fixing eye about two weeks after the first eye has been operated.

There are a number of minor surgical problems which cannot be fully covered in so brief a communication. One, however, is of considerable importance. How should a residual deviation of seven or eight degrees be treated, even though fusion is possible with the stereoscope? In children under six or seven, stereoscopic training should be continued with the hope of eventually correcting the entire deviation which will not even show an esophoria of three or four degrees. In a great majority of instances, even low degrees of deviation should be corrected by tucking, by recession, or by a cinch operation. Obviously, as the child passes into adolescence and on into adult life, an esophoria of seven or eight degrees will probably cause symptoms. If this deviation remains fixed, it is much wiser, in order to insure continued perfect vision in the squinting eye thoroughly to establish well-developed fusion, and to obviate the discomfort of symptomatic esophoria later in life, to restore the visual axes to parallel-

ism by surgical methods in childhood. The future outlook will be much better, and there is a satisfaction in being able to restore normal function to a squinting eye.

A second minor surgical problem should be briefly mentioned. There is much discussion as to the advantage of expressing in millimeters and measuring with calipers the exact amount of resection or recession which should yield a correction which can be expressed in degrees. Were this possible, it would solve many of our problems and would make surgical procedures purely a matter of mathematics plus surgical technic. A broad experience in ocular muscle surgery can only lead one to the conclusion that experience and good surgical judgment cannot be replaced by millimeter measures and calipers. The reasons for this conclusion are obvious. Each patient becomes an individual case, modified by the relative strength and size of each of the muscles, their attachment to the globe, their modification by abnormal conditions to which I have previously referred, and the condition and influence of the capsule, cheek ligaments, and muscle sheaths. To these variable factors can be added innervations, habits, the personal equation of the operator in his ability always to introduce sutures in exactly the same way, and other factors which are equally inconstant. Judgment and experience furnish the real measure of what is needed in each case. These can only be acquired by serving an apprenticeship to a master in the art, or by industrious practice until one's judgment is trustworthy. There can be no objection to the accurate measurement in millimeters of the mental calculation as to what a case may require, but there is no rule of linear measure which will yield the same degree of correction in all cases.

Stereoscopic training. As previously stated fusion training may be instituted after operative treatment has been practiced. At this time, the entire technic is very much simplified. The stereoscope can now be used instead of the amblyoscope. Under any condition in which real cures are sought, the stereoscope should be used for varying periods after operation to complete the cure and to stabilize single binocular vision. Prisms may or may not be necessary in this training. If a small degree of residual squint is present, fusion may be aided by prisms placed in the stereoscope, bases out. As fusion improves, prisms so placed can be diminished gradually, and, if necessary to increase abducting power, prisms may be reversed and placed, bases in.

There are instances, however, in which a small degree of squint will remain, although the two eyes are used together, and the squint only becomes apparent under the cover test, or when the eyes are not engaged in fixation. This type of case was referred to in closing our discussion on surgery. The reasons for this residual squint were not stated. After surgery, adhesions may take place, or the operative procedure may have fallen a bit short of perfect results. The young child with fusion thoroughly aroused will be able to overcome this slight defect without symptoms. As stated previously, such residual esophoria may cause symptoms in adult life, and if fusion exercises cannot fully restore the visual axes to a practically normal balance, a very little additional surgery will bring the result, and will shorten the postoperative stereoscopic training.

The contributions of Dr. Maddox, Miss Maddox and others in the awakening of fusion and in restoring this faculty have added a useful chapter to our book of knowledge on the subject of squint. The cheiroscope and its modifications add not only efficiency but variety to tasks which soon become burdensome and monotonous to the average child. Drawing or copying which requires the use of both eyes at the same time, may or may not be more valuable than the proper use of the stereoscope, but it adds variety and at least possesses the advantage of certainty that both eyes are being used.

In later years, fusion, if present, has not given me the concern which it formerly did. If fusion does not promptly respond to treatment after operation, there are several good reasons for failure. Operative procedures may have fallen short of perfect results, calling

for too much conscious effort on the part of the patient, or the fusion sense may be so inherently defective that perfect results may never be obtained. The first reason for partial failure has been discussed. A little more surgery will complete the cure. In the latter instance, if a fair trial does not bring adequate results, it is probable that the wiser course to pursue will be to abandon the fight if the patient's power of suppression is under perfect control and no symptoms appear. It is my experience that the fusion faculty, if capable of full function, responds promptly and with little artificial stimulation. As a postoperative procedure, however, the stereoscope is a great adjunct to stabilize and coordinate the ocular movements, with added comfort to the patient. For this purpose, the Wells series of charts are most admirably adapted in that they provide for graduated separation of the images, so that amplitude may be broadened by running through the series, as well as by slowly moving the cards back and forth along the arm of the stereoscope. In order to relieve the monotony of repetition, after the child has thoroughly grasped the object of the training, the mechanical cards may be replaced by interesting views which are specially constructed for this purpose.

Cheiroscope and stereoscope may be regarded as complementary or supplementary, the former especially adapted to specific training under supervision, the stereoscope for home use under the care of the mother. The former may not always be available. The latter can be placed in almost any home.

This completes the cycle of training which promises so much in monolateral convergent squint.

Alternating Esotropia

I have followed rather minutely the system of training which has yielded most gratifying results in the monocular type of esotropia. The modifications applicable to the treatment of the alternating type can be briefly stated.

Refraction should be followed with the same care as previously described, but with little hope of correcting the deviation. Nevertheless, it is essential. Fusion is totally absent, and fusion training need not be practiced. In fact, it is best not to disturb the habit of suppression. Amblyopia does not occur and does not become a source of anxiety.

The deviation can be corrected only by operation, and this should be practiced when the child is three years old, or as soon thereafter as the parents will permit. In a general way, the same surgical principles apply to the correction of this form of squint, with one exception. As the eyes will not be used together, convergence need not be so meticulously considered, although in later life good convergence may save the patient embarrassment if it is well preserved.

Diplopia need never be feared. The alternating squinter learns the habit of suppression early in life, and the passing diplopia which may be present for a day or two after operation soon disappears.

Divergent Squint

Most cases of divergent squint are alternating in type. A few are monolateral. The age of onset renders amblyopia rather rare. In most instances of amblyopia in exotropia, the divergence begins at an earlier age than is usual. Fusion, as a rule, is present and of fair degree. The deformity is less conspicuous than is that of esotropia. In most cases one must resort to surgery to effect cures, and these measures must be pushed most vigorously to bring results.

With these facts in mind, the application of the principles which I have discussed are easily followed and modified.

Refraction. Myopia may predominate, but hyperopia also is observed. The underlying principles of refraction are too well known to need further stressing in their relation to squint. Naturally the myopic error should be fully corrected and hyperopic errors may be corrected as in every-day practice.

Amblyopia is of rare occurrence, because the squint develops as a rule after the maculae are well formed and active. A few cases, however, have come to my notice in private practice and in

those cases, the lowered vision responded to the usual treatment.

Fusion, as a rule, is better developed in divergent squint than in the convergent type. When defective, it is trained as in esotropia, but its full restoration rarely makes any marked impression on the deviation.

To be brief, refraction is essential and fusion training desirable; but few cases of divergent squint can be fully corrected without surgery followed by stereoscopic training.

Surgical treatment. There are certain inherent differences between the surgical correction of exotropia and that of esotropia, which should be studied in order to understand the somewhat different plan of procedure required in this type of squint.

They are as follows: 1. Operations on the internus are obviously most difficult. The tendon is attached closer to the limbus and an advancement, therefore, does not net one the same gain as can be obtained on the external rectus. Manipulations of the internus are most difficult because of the cramped space in which one must operate. The tendon is shorter and tuckings and resections must be practiced on the muscle itself. The gain, therefore, is manifestly less on the internus than on the externus. Recession of the external rectus is easy, but is of very little value in itself. Fortunately, when combined with shortening operations on the internus, a recession of the external rectus adds much to all shortening operations on the opposing muscle. Because of these limitations, the same operations which were discussed in esotropia are easily forty percent more efficient than in divergent squint. Over-correction need not be feared, and on the contrary, in many instances even well-planned procedures are inadequate. In a general way, however, with the above-mentioned peculiarities well in mind, the surgical principles as outlined for monocular esotropia are applicable to divergent squint.

If one is disposed to practice O'Connor's cinch operation, it may be used to advantage on the internal rectus. The reasons for its special adaptation to the internal rectus are, first, its positive shortening action; and second, its adaptation to a small operating field. The dermal is easily introduced, and the field of operation is not narrowed until the loops are transferred from the dermal to the muscle strands. The operation is then completed, and there remains only the introduction of a running conjunctival suture to close the wound. The operation, when properly practiced, is the most positive of all shortening operations. Its objections have been discussed. To these should be added the tendency of the tendon loops to become attached to the sclera. This may be avoided, if the surgeon does not fear the risk of infection by allowing the operated eye to be unbandaged the day after operation. In fact, O'Connor stresses this feature of his operation to avoid adhesions. Inasmuch as the dermal is left *in situ* for twenty-one days, the risk of infection cannot be ignored.

In this review of the management of concomitant squint, I have entered into rather minute details of some phases—the essential aspects, which differ considerably from what we were taught twenty years ago. Each method advocated has been thoroughly tried and its efficiency has been tested. There may be some ideas to which you may not all be willing to subscribe. In my hands, the methods as outlined have proved to be worth while, and until other methods which offer more satisfactory results are presented, I submit for your serious consideration the foregoing plan of treatment. I sincerely hope, in the discussion to follow, further suggestions may be offered, especially in the matter of better training for amblyopia and for fusion. Much remains to be developed, especially in the treatment of hospital and clinic patients. One meets with many difficulties in private practice, but the clinic patient furnishes the great problem.

In either type of patient, enthusiasm, patience, attention to details, good surgical judgment, and good surgical technic are the essential elements which insure success.

1930 Chestnut street.

THE EYE AS A FACTOR IN THE DIFFERENCE IN HUE BETWEEN DAYLIGHT AND TWILIGHT

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The eye apparently does not combine the wave lengths of the spectrum to white in the same proportions at all intensities. From the Research Laboratory of Physiological Optics, Wilmer Ophthalmological Institute, Johns Hopkins Medical School.

The bluish color of twilight illumination in contrast with the yellow coloration of sunlight and the more nearly neutral hue of daylight, has at various times presented a problem for discussion. It is the purpose of this brief note to consider the two most probable factors in the causation of this phenomenon. The first is physical; the second is physiological.

(1) The source of twilight is not direct sunlight but sunlight reflected from the upper layers of the earth's atmosphere. In other words it is skylight. Skylight is bluish light. The sky owes its blue color in all probability to the selective reflection and scattering of the light waves by the small particles in the upper atmosphere. These particles scatter and diffuse the short waves which give the blue appearance to the sky. Robbed of a part of its short waves, principally the blue, direct sunlight is unbalanced in composition towards the long-wave end of the spectrum and thus appears as yellow or yellow tinged with red. Selective absorption and reflection by the lower layers of the atmosphere also influence the color of the light received at the surface of the earth. In short, the estimated temperature of the sun is such as would lead us to expect sunlight to be white before it reaches the earth's atmosphere. In passing through the atmosphere, however, direct sunlight is unbalanced towards the red end of the spectrum, skylight towards the blue end, and daylight, which represents a mixture of sunlight, skylight, and light reflected and diffused by the lower atmosphere, varies in hue and composition with the proportions of the components present at any time.

(2) The eye does not combine the wave lengths of the spectrum to white in the same proportions at all intensities. The proportions of short and long wave lengths which give white light at the higher intensities, give light of a bluish tinge at lower intensities. This can be shown experimentally in various ways: (a) Complementary colors and various combinations of paired complementary colors can be made with a spectrum color-mixer at various intensities of light. Data will be published on this point later. (b) The critical colors, blue and yellow, may be combined as pigment colors in a rotating color-mixer by the method of successive impressions. The impressions from colored discs combined in this way to give neutral gray at the higher intensities, give bluish gray faintly tinged with purple at low illumination. The tinge of purple is a change in hue which blue undergoes at low intensities. (c) Mazda light filtered to match the color of daylight at the higher intensities becomes bluish at low intensities. This is quite readily demonstrated in one of our optics rooms which is provided with a skylight equipped to give artificial daylight. The entire ceiling of this room is made of diffusing panels or sashes of imported Belgian flashed opal glass. This glass has a high coefficient both of transmission and diffusion. Above these panels, at a suitable height and suitably spaced are thirty 500-watt, specially designed, opaque, bowl-shaped reflectors installed pendant and equipped with roundels of daylight glass supplied by the Macbeth Daylighting Co. Each of the units is on a separate switch. When all are turned on, 10 foot-candles of illumination are given on the working plane. At this intensity of illumination the light, so far as can be told by the eye, is of daylight color. From the standpoint of distribution, diffusion, color, ocular comfort, and efficiency, the illumination seems to be a very close replica indeed of that which is obtained when the arti-

ficial light is turned off and the curtains rolled back to admit daylight. When only one of the units is turned on, however, the color of the illumination is bluish. By turning off these units one after another, one is able to demonstrate in a few seconds in almost unbroken sequence the color changes from daylight to twilight. The change in the reverse direction can be shown just as successfully; hence the phenomenon is in no way connected with progressive adaptation either to color or to brightness in so far as we have knowledge of that function or process at this time. Also there is no change in the composition of light. The phenomenon is a very pretty demonstration of the fact that the eye does not combine the wave lengths of the spectrum to white in the same proportions at all intensities. (d) The darker grays tend to have a bluish appearance. This, in the cases where there has been no disturbance of the composition of the light by the reduction of the coefficient of reflection, is in all probability but another example of this phenomenon. The lower intensities of light reflected from the darker grays shift the proportions in which the eye combines the wave lengths to white.

With change of intensity of light all the colors undergo changes in hue, saturation, and brightness. At very low intensities, all, with the probable exception of red, are seen as gray of some shade of brightness. In general the effect of an increased intensity of light on the color sensation can be described as follows: There is an increase of luminosity which is more or less regular over small ranges of the intensity scale. Saturation increases to a maximum and then decreases to zero or a very low minimum. The point of maximum saturation is reached at a comparatively low intensity, which varies in the different parts of the spectrum but is never higher than 0.5 foot-candle. Hue is affected in a very complicated and irregular way by changes of intensity. A few of the changes in hue for spectrum lights may be mentioned. All the wave lengths from red to yellow pass through yellow to white with increase of intensity beyond the point of maximum saturation. Green also passes through yellow to white with increase of intensity. At low intensities red becomes brownish and yellow greenish; orange is tinged with greenish brown and blue with purple. At very low intensities green is seen as blue or blue-green. These changes are, however, not to be confused with the power to neutralize or cancel the complementary color. The power to cancel the complementary color is by no means the same as the power to arouse the color sensation. When combined in the proportion to produce white, the two colors may be and most frequently are, of quite different saturations. Difference in the rate of loss of saturation of the component colors with decrease of intensity, therefore, is probably not a significant factor in the bluish tinge which is acquired by white light at low intensities.

The Wilmer Institute.

VISUAL FIELD STUDIES

IV. Pseudocontractions of the upper form field

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This is a study of the effect of ptosis and allied conditions upon the visual fields, which may be anatomical as well as pathological. From the Evans Memorial of the Massachusetts Memorial Hospitals. Read before the Academy of Ophthalmology and Otolaryngology at Montreal, September 23, 1932.

In any branch of medicine during routine examinations of a large series of cases, it frequently happens that some relatively unimportant or pathologically insignificant condition recurs with sufficient frequency to attract attension. The analysis of cases that present such a condition, using as a background all of the available clinical and laboratory data, will occasionally bring to light correlations which may assume an etiological significance. With this fact in mind the writer desires to report a series of cases in all of which there was a cutting of the upper form (or white) field of vision with recovery to normal limits when the upper eyelid was raised.

The cases constituting this series, 230 in number, were seen in the routine eye examination of 1903 patients in a group of 3100, studied at the Evans Memorial of the Massachusetts Memorial Hospitals, in connection with the Endocrine Service, over a period of five years ending December 31, 1928. No selection of cases was made as far as the ophthalmologist was concerned, the eye examination being one of many routine procedures carried out on all hospital cases regardless of any complaint and on a large number of outpatients when it seemed helpful to obtain the eye findings as an aid in the diagnosis of a wide variety of morbid states.

All of these patients were admitted for more or less complete diagnostic study, the general method of which has been described elsewhere[1]. The ophthalmic data observed and recorded included the determination of visual acuity, pupillary measurements and reactions, extraocular motions, the condition of the ocular media and fundi, and the determination of the form and color fields.

Table 1

GENERAL DIAGNOSIS

Endocrine	
Pituitary	
hyperfunction	2
dysfunction	47
hypofunction	20
Thyroid	
hyperfunction	1
dysfunction	4
hypofunction	30
Gonad, hypofunction	13
Pancreas, hypofunction	1
Pluriglandular, dysfunction	8
Total endocrine cases	126
Nonendocrine	
Infections	
sinusitis	3
tuberculosis	5
arthritis	4
focal (misc.)	6
Psycho-neuroses	
neuroses	4
psych.-neur.	5
psychoses	1
Cardio-vascular	
cardiac	4
renal	5
card. renal	8
hypertension	1
Lesions of cent. nerv. sys.	18
Hepatic	19
Syphilis	8
Goiter, nontoxic	5
Blood	3
Miscellaneous	
skin	2
pelvic	1
cancer	1
gastro-intestinal	1
Total nonendocrine cases	104
Grand total	230

Table 1 gives the general diagnosis covering quite a wide range of conditions. One point stands out as significant in this group; namely, the frequent evidence of general metabolic dis-

turbance. That this should be anticipated in the endocrine group follows directly on the fact that the endocrine glands are primarily regulators of metabolism. In the nonendocrine cases there are likewise many unmistakable evidences of profound metabolic disturbance. This state and the peculiar eye findings are the only two common points presented uniformly throughout the series.

In this same group of cases were discovered an unusual number of markedly contracted fields which were reported in 1929[2]. Since the findings reported in this communication have not been dealt with particularly by authors of text books or investigators and since their occurrence is quite frequent, especially with certain types of field-taking devices, it seemed warrantable to the writer to offer his findings with an attempt to explain their significance.

The Peter hand campimeter was used in recording the fields. This apparatus was selected for its flexibility and adaptability to the varying conditions under which many of these patients required examination. Many were bed patients and many had physical or mental faults or were of an age that made them unsuitable for the more extensive or laboratory procedures which might have counted in suitable cases for greater accuracy. The number of patients tested at a given session also entered into the selection of this device. Often ten or more patients were taken consecutively. The frequent fatigue of patients studied in many instances was an argument in favor of a quickly outlined visual field.

The technic consisted in having the patient (without glasses) comfortably seated in an armchair, resting his elbows thereon and holding the slate with each hand in such a position that his general facial plane would be parallel to the campimeter and at right angles to the line of fixation. A small white cross was drawn in the center of the slate and in its center a small red dot was made, for by this means, in the average case, both patient and examiner could more easily secure and maintain reliable fixation. The blind spot was first delineated, using a one-degree white object, and passing from blind to seeing. The form field was then obtained by a two-degree white object, in slight motion, passed in, over several meridians. The field for form rather than for white was considered more reasonable in view of the absence of a standard illumination and of lowered visual acuity and other factors present in many patients, which will be discussed later. Color fields were outlined by the same two-degree objects. Good daylight or approximately equal diffuse artificial illumination was used. For a first study or general-field delineation these larger test objects were used. When pathologic deviations were encountered re-studies were made with smaller objects and frequently on the more exact Ferree-Rand apparatus.

These upper form field cuttings are named by the writer *Pseudoform-field cuts* or *contractions* when the field was found normal on raising the upper eyelid by the examiner's finger. The cutting varied from a broad band of twenty degrees extending from the temporal to the nasal limits of a more-or-less-quadrangular form to a nearly triangular loss when a lid drooped over the outer palpebral fissure. No cases were included which recorded less than a five-degree cut and a full temporal-to-nasal loss.

Table 2

UPPER FORM FIELD CONTRACTIONS RECOVERED BY RAISING LIDS

230 CASES IN 1903 PATIENTS (12+ PERCENT)

Form contractions only	224 cases,	97.4 percent
Form and color contractions	6 cases,	2.6 percent
Binocular contractions	202 cases,	87.8 percent
Monocular contractions	28 cases,	12.2 percent
Also blind spot enlargement	60 cases,	26. percent
Pupil, muscle, media, fundus changes	47 cases,	20.4 percent
Refractive errors, (estimated)	105 cases,	45.6 percent

Table 2 shows that a large percentage (87.8 percent) were bilateral losses although not always symmetrical. A few (12.2 percent) of the patients exhibited monocular cuts, some of which

Table 3

CLASSIFIED LID AND ORBITAL CONDITIONS
136 CASES

Orbital encroachment	2
Deep-set eyes	8
Overhanging brows	3
Long lashes	2
Heavy or redundant lids	4
Dermatitis	1
Blepharochalasis	3
Enophthalmos	1
Ptosis (trauma homolateral, 1; contralateral, 1)	6
*Lid droop	106

* Scarcely noticeable unless sought for. Many refractive errors.

were due to trauma. A number (2.6 percent) had cuts deep enough to invade the normal fields for blue and occasionally also for red. In the forty-seven patients exhibiting deviations from the normal in pupils, extraocular muscles, media, and fundi, these faults should not be considered as affecting the upper field limits, since recovery was obtained by raising the lid. However, refractive errors seemed to play some part in producing this phenomenon. The effort at fixation necessary in presbyopia and, perhaps to a less degree, in high hyperopia and marked astigmatism, especially at the short distance of the Peter campimeter, certainly led the writer, clinically, to this conclusion.

Table 3 analyzes the attempt to find some organic or functional factor having etiologic significance. Previous perimetric and campimetric experience had not brought this condition so noticeably to the writer's attention until the work at the Evans Memorial produced a large volume of consecutive material under good control from the point of view both of the data obtained and of their recording.

The first interpretation of this phenomenon was that it might represent a functional fatigue syndrome similar to the quadriceps test suggested by Lahey[3] in cases presenting thyroid dysfunction and deriving from levator lag or fatigue. Analysis of the first series of cases, however, showed so large an incidence in patients presenting disorders unassociated with thyroid disease that no specific diagnostic significance could be attributed to it. At this juncture greater notice was given the conditions listed in this tabulation which accounts for the fact that only 136 cases were thus analyzed.

Holloway and associates[4] found wider form limits in exophthalmos of hyperthyroidism which might be expected in contradistinction to the one case of enophthalmos in this series. Ptosis would logically be expected to register upper field limits. Figures 1A and 1B show such a condition and it is suggested that the visual field might offer a satisfactory method of measuring and recording the amount of ptotic fault. Anatomical interference to a well-opened palpebral fissure is easily accounted for by changes in the bony orbit, in the tissues of the brow and upper lid, and even by long lashes. Pathologic changes in the palpebral tissues due to dermatitis, blepharochalasis, or edema act similarly. But in this series the largest number of faults was found in cases in which the lids were apparently normal both organically and functionally. Nevertheless, on careful observation, it was seen that the lower border of the upper lids covered the upper pupillary area, thus interfering with full upward vision. For want of a better term these were classified as "lid droop."

In a previous paragraph refractive errors were referred to in relation to their effect upon these upper-field contractions. This is easily demonstrated in many cases by observing first the level of the upper lids when the patient fixes at a distance and then fixes at the near point upon an object of about the same size as that on the campimeter or perimeter and placed at a similar distance and level. It will then be noted that a decided lowering of the lid level transpires. This is doubtless due to an associated orbicular tone synchronous with fixation in accommodation. The physiologic explanation may not be apparent but the clinical observation is a fact. Refractive errors, undoubtedly, are responsible for many of our findings when the field is taken without glasses. Figures 2A and 2B demonstrate the larger field with glasses. Figure 3A shows a campimeter pseudocontraction

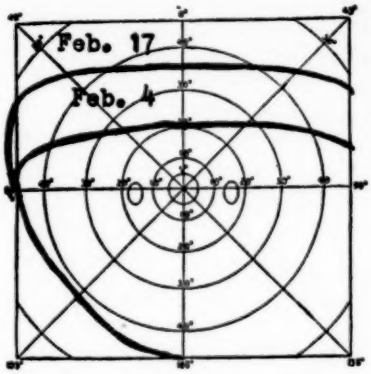


Fig. 1A (Rowland). Functional ptosis measured and recorded at intervals.

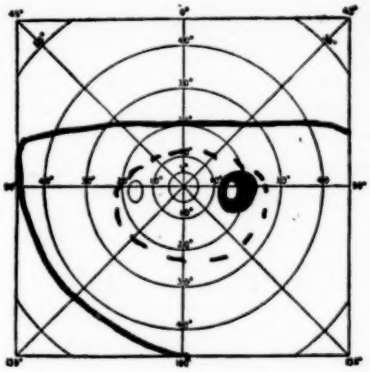


Fig. 1B. Organic ptosis. (Contralateral eye recovered a normal field from an equal cut by fascia-latta hammock operation by the late Dr. Derby.) Form ———; red – – – –.

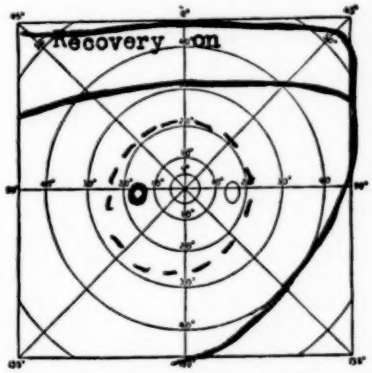
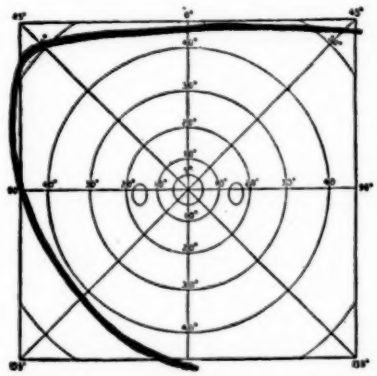


Fig. 2A (Rowland). Fields taken without glasses. Vision, O.D. 20/100; O.S. 20/100. Form ———; red – – – –.



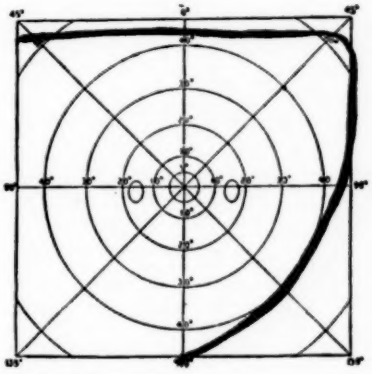


Fig. 2B (Rowland). Same fields taken with reading glasses:
O.D. +2.25 D. sph. ⌔ +2.00 cyl. axis 105°
O.S. +1.87 D. sph. ⌔ +2.12 cyl. axis 77°.

verified on the Ferree-Rand instrument (fig. 3B).

Among the outstanding findings elicited in a careful study of these patients were the metabolic faults determined and variously exhibited as previously referred to in Table 1. The lowered physical and also, to a less de-

gree in many cases, the lowered mental tone or alertness resulting therefrom reflect themselves in no small measure in body attitudes and facial expression, the palpebral eye-lid muscles having much to do with the latter. In a normally prominent eye or in exophthalmos, the field is unusually wide in from frontal or anterior ethmoid sinusitis, orbital cellulitis, myxedema of hypothyroidism; restriction of motion by nodules or induration as in chalazia, ankyloblepharon, symblepharon, scars from trauma, burns or suppurating sinuses; levator palsies and fractures of the upper anterior orbital margin

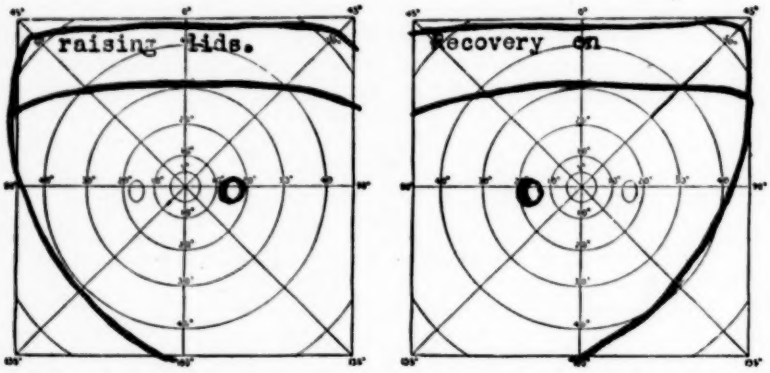


Fig. 3A (Rowland). Recovered upper form field contractions. Peter campimeter.

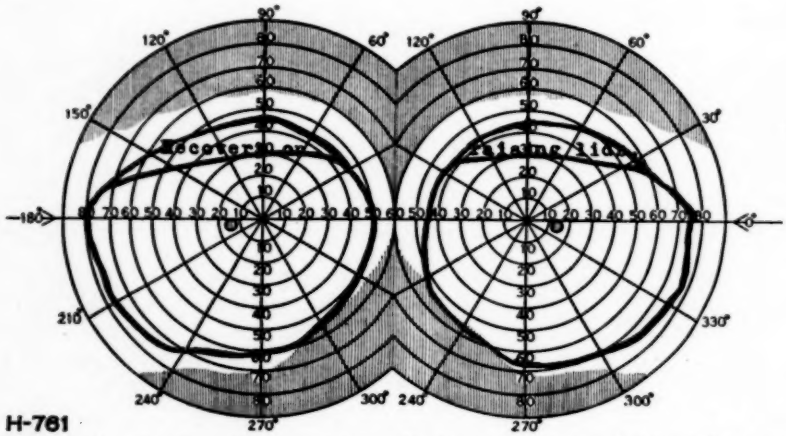


Fig. 3B (Rowland). Pseudocontractions of the upper form field of 3A, verified on Ferree-Rand perimeter.

its limits, and *per contra* anything which narrows the palpebral fissure in any way may contract the altitudinal limits of the field proportionately.

In considering the field defects produced by observed conditions in this series of cases, it comes to mind that many other conditions logically could produce like phenomena. Edema of the upper lid from any cause such as insect stings, lid abscesses, empyema with depression—all are to be thought of. Morton[5] in the Encyclopedia of Ophthalmology discusses many factors that influence the field of vision. A larger pupil gives a wider field because light thus reaches the anterior areas of the retina. In accommodation, as in hyperopia, the iritic plane is farther forward and since the nodal point follows this movement the field is thereby widened. Conversely, smaller pupils or

myopic vision will register proportionately smaller visual fields. Cranial configuration and bony orbital margins may interfere with full vision as well as deep-set eyes in normal orbits. Some of these are racial characteristics. Redundancy of fat or skin in the upper lids restrict upper limits. He refers to several observers who analyzed the effect of correcting glasses on the peripheral fields. If eyeglasses are small, they may either not cover the extreme perimetric limits or affect the field limits by prismatic displacement, sometimes enlarging, sometimes contracting, according to the exact physical problem involved in the given case. Nothing is noted in these reports concerning the wider palpebral fissure obtained by easier fixation when the refractive error is great enough to produce a "squinting" effort, which the writer of this communication considers of some importance, especially for short-range apparatuses.

Ferree and Rand[6] in analyzing a large group of patients to determine the effect of errors of refraction, age, and sex in relation to the size of the form field conclude: Refractive errors are influencing factors varying with individuals, more important after the age of forty, and sex plays an insignificant part. Their chart shows a considerable narrowing in the presbyopic age, even with their ideal apparatus.

Peter[7] calls attention to the width of the palpebral fissure in relation to possible altitudinal contractions; to the effect of pupillary diameter and plane of the iris; and to the activity of the extreme nasal retina as well as its forward attachment resulting in wider temporal limits. He states that the field is narrowed in myopia and enlarged in hyperopia. In presbyopia the field is generally narrowed because of reduced retinal sensibility resulting from subnormal accommodation.

Traquair[8], discussing the same factors, feels that uncorrected refractive errors may cause apparent contraction of fields.

Roemer[9] in discussing the interference of lids in the visual field states that if the upper lid is strongly raised or drawn back, wider limits will be the result.

Since this study concerns itself only with upper contractions and normal limits obtained by raising the patient's upper lid, at least some of the factors referred to as limiting visual fields by the writers before mentioned do not enter into this particular problem. These various orbital or lid conditions are infrequently encountered in cases in which field studies are carried out for specific diagnostic purposes, but when a large series of patients is routinely studied, without reference to suspected or unsuspected ophthalmologic faults, the relation between the phenomena and the apparent etiology becomes more obvious as is seen in this study.

Two brief protocols exemplifying one endocrine and one nonendocrine condition may be expository to the text.

Case 1. Thyroid Failure. The patient was a white boy, 16 years of age, who complained of pain and discharge in the right ear. There was a history of ear trouble since early childhood with bilateral paracentesis at the age of two years, during an attack of pneumonia. There had been frequent, recurrent attacks of pain and tenderness, but no marked loss of hearing. The patient had had several attacks of pneumonia and several tonsillectomies. He had had hives in the previous spring. The boy was fairly nourished. There was a thick, grayish discharge from the right ear and the drum was partly occluded; in the left ear was much wax. The nose showed inflamed membrane and crusting. There was some rigidity and tenderness in the upper right abdominal quadrant. The urine was normal except for a trace of albumin. There was a marked lymphocytosis, a depressed sugar tolerance. The boy was 10 percent underweight and a basal test showed —19 percent with a slow pulse. X-ray examination of the sinuses and mastoids was negative. The Bárány test elicited a normal reaction. A subsequent abdominal examination did not confirm the earlier report. An audiogram showed a slight loss of hearing in the right ear. A duodenal function

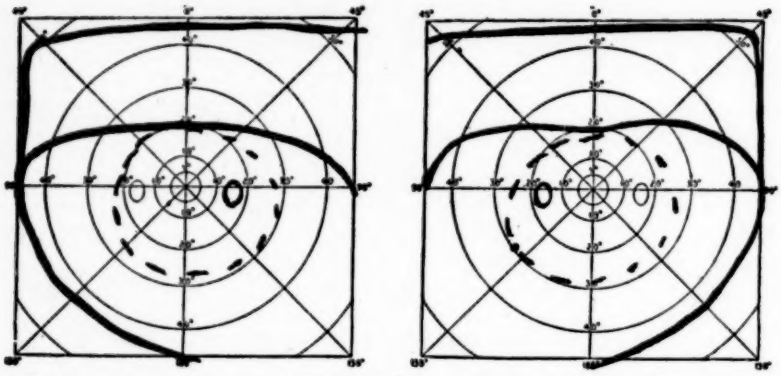


Fig. 4 (Rowland). Upper form field cutting in Case 1, July 20, 1927. Form —— 2°; red – – – – 2°.

test showed marked hepatic disturbance.

The general picture in this case was consistent with thyroid failure with the sole exception of the lowered sugar tolerance and this was directly attributable to the demonstrated hepatic dysfunction.

Eye Findings:

Vision was 20/20 and Jaeger 1 each eye. Pupils and extraocular muscles were normal; media and fundi normal. Fields exhibited marked upper form field cutting recovered by raising the lids which covered the upper third of the pupils.

Case 2. Pulmonary Tuberculosis. The patient was a white woman, 25 years of age, who complained of weakness, loss of weight, easy fatigableness, and a marked susceptibility to colds. She dated the condition from an attack of influenza two years previously and said that the whole condition had become progressively worse. There was also a history of pain, intermittent in character, along the lower spine. She had had pneumonia some years previously and there was a history of abscessed ears following a tonsil and adenoid operation. She complained of a chronic cough, a late onset of the catamenia with earlier irregularity but present normal function. She had lost 5 lbs. in the past two weeks. Examination showed a flushed face, a somewhat flat chest with a generalized distribution of coarse and moist râles. The urine picture showed somewhat scanty elimination and a high residual nitrogen. The blood was lymphoid in type. She was 20 percent below her predicted weight and exhibited some loss of lung volume. The basal rate was the normal value of 1 percent with a somewhat rapid pulse. X-ray examination of the chest showed

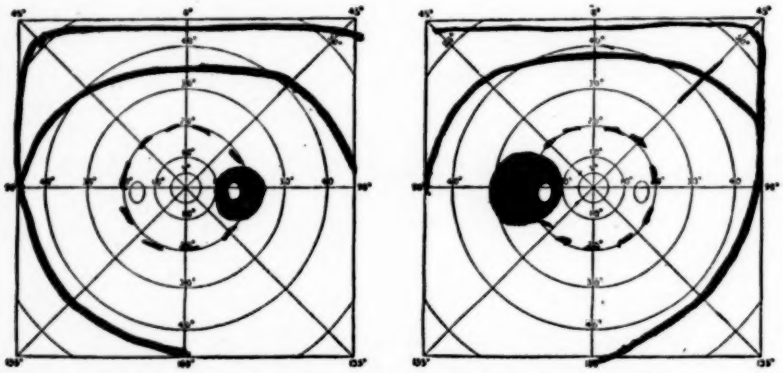


Fig. 5 (Rowland). Upper form field cutting in Case 2, June 1, 1927. Form —— 2°; red – – – – 2°.

slight mottling at both apices above the clavicles, an increased diffused density throughout both lungs except at the bases.

The patient gave no evidence of any endocrine condition, while both the physical findings and X-ray indicated an active pulmonary tuberculosis.

Eye Findings:

Vision was 20/20 and Jaeger 1 each eye. Pupils and extraocular action were normal; the media clear; and the fundi were normal except for yellowish discs. Visual fields showed slight upper form field cuts recovered by raising the lids, slightly contracted color fields; and quite large blind spots.

Conclusions:

1. Upper-field contractions may be due to a wide variety of conditions affecting the lids, orbits, intraocular structures, optic nerve, or the visual pathways.

2. If normal field limits are obtained by a wider palpebral fissure, the pseudocontraction differentiates the phenomenon from altitudinal hemianopsia.

3. A careful study of the patient may also discover metabolic or other faults having a bearing upon the field change.

4. Perimetry is suggested as a means of measuring and recording ptosis.

Grateful acknowledgement is made to Allan Winter Rowe, Ph.D., Director of the Evans Clinic, for an analysis of the physical and laboratory data, and to the writer's associates for aid in the ophthalmologic observations and records.

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DR. RANDALL AS AN OPHTHALMOLOGIST

BURTON CHANCE, M.D.
PHILADELPHIA

This is an appraisal of Randall's work in the ophthalmic field, together with a list of his contributions to ophthalmic literature. Read before the Section on Ophthalmology, College of Physicians, in Philadelphia, October 20, 1932.

On January 4, 1932, there passed out of this life, Dr. Burton Alexander Randall, a distinguished Fellow of the College, and one who was once a prominent member of this Section. In the minds of the present generation of practitioners his name has been indissolubly identified with otology, but to those of the 80's and 90's, Randall was well known as an ophthalmologist, and for thirty years he contributed to and helped to maintain the prestige which the science had attained in Philadelphia, particularly that emanating from this Section of the College of Physicians. It was my privilege to have been honored by his friendship, and it is because of that honor that I would endeavor to pay tribute to his position in the ophthalmic world.

Dr. Randall was interested in ophthalmological subjects from the earliest days of his medical studies. For a season, while demonstrator in the physiological laboratory at the university, he excelled in his exposition of the science of optics and its relation to the human visual organs. Soon after entering into private practice, he became identified with the study of the effects of uncorrected ametropia, believing that conditions found in eyes so affected in adult life might have been at least mitigated, had corrective measures been instituted in adolescence, if not in childhood. Accordingly, he created opportunities for the study of groups of individuals, living or occupied in community environments, with the intention of observing how given classes of ametropes might react to the stress and strain of their occupations. Thus he sought to study the eyes of students in the Medical School of the University, the results of which study were published in 1885. In the meantime, in association with Dr. Risley, he made a study of the eyes of children in the schools of Philadelphia, comments upon the report of which appeared in 1882. In 1885 he issued a wider and more extensively critical study of the statistics obtained in the examination of the refraction of large groups, especially among school children. The fruits of these labors are still manifest, for it is to Risley's and to Randall's observations and the teachings which they advanced, that the care given to all school children in this country is due.

From the examination of one hundred and twenty medical students of the second-year class, out of a total number of one hundred and thirty-five, the findings in ninety were carefully recorded. Of these only eight percent were emmetropic; the rest manifested a greater or less degree of ametropia in one or both eyes. Hypermetropia was the predominating manifestation; half of the subjects were astigmatic; eleven were myopic, in five of whom the affection was monocular, and in not one case was the condition of the fundus even fairly good, as all presented distinct disturbances of the choroid. Randall's reports and the methods which he employed in the examinations compared well with what had been published by examiners in Europe. His analysis of others' studies, which appeared in 1885, covering references to one hundred and twenty-four publications, represents a truly great labor, and exhibits a remarkably critical acumen by one who had been graduated only five years. In the meantime he had been observing the physiologic reactions of accommodation, for which he devised working models, explaining its mechanism in class-room demonstrations. By means of homely implements he was able to illustrate lucidly the difficult chapters connected with astigmatism and the means of correction by lenses.

In 1883 he had an opportunity to go abroad for his first course of European study. He served in Dimmer's laboratory for a while, where he learned to

prepare tissues and to make sections for microscopical study. This visit to Europe had a great influence on him, because through it he was brought into contact with the illustrious ones who at that date were teaching and with those who had presided at the birth of modern ophthalmology, notably Arlt, Jaeger, and Donders. Randall had become interested in otology also, and during his travels visited the famous clinics devoted to diseases of the ear as well as the ophthalmological ones, and through the instructions that he received at the ear clinics, laid the foundation for his later practice.

On his return to America he entered deeply into otology, and was soon after made Professor of Otology at the Polyclinic Hospital and School for Graduates; Clinical Professor of Otology at the University; and Ophthalmologist and Aural Surgeon at the Episcopal and at the Children's Hospitals. Yet, even with these honors, he, as late as 1894, modestly signed himself "Assistant in the University Eye Clinic." It was there, while he was attached to Dr. Norris's clinic, that I first met him. Thus, until his last years, he continued to be interested in ophthalmological science, manifesting an active concern in the problems connected with refraction. He likewise never failed to enter into discussions at the meetings of this Section, of the County and State Societies, and those of the American Medical Association, as well as at the gatherings of the American Ophthalmological Society, into the Fellowship of which he was elected in 1885, continuing active therein until 1925, when his name was placed on the Emeritus List. His last participation was to discuss Dr. Cowan's paper on "Visual Test Charts," in 1928.

He had become impressed by the belief that myopia is an acquired state depending upon uncorrected hyperopia of low degree. It may safely be said that we, in this community at least, if not in America, owe largely to Risley's and to his labors the principle of practice which demands that the sight of children should be conserved and kept under observation well on into the early years of maturity.

In 1888 he appeared at the International Congress at Heidelberg, as the American champion for early attention to the disorders of refraction, when he presented an analysis of the statistics derived from one hundred sixty-seven reports. He maintained that myopia is practically unknown in infancy, but that it appears more or less early during the school years; hyperopia, on the contrary, he noted was present in infancy and commonly observed in school days, and he dared to declare, that, as emmetropia is mathematically of doubtful existence, hyperopia might be considered the normal state of the human eye. He then contended that for the accurate measurement of ametropia, complete cycloplegia must be obtained; he, up to that time, having employed hyoscyamine. In addition to the trial-case lenses, the employment of which he looked upon as of the very greatest importance, he practised retinoscopy, obtaining greater accuracy of results when making observations at four meters than at shorter ranges; and, by the direct-method of ophthalmoscopy thoroughly explored the fundus. He advocated full correction in hyperopia, and in myopia, too, he would order the full measure, yet not in all cases, selecting those in which he felt it was justifiable. Although errors might be present in any case, he would not insist on glasses for every patient, but only for those presenting symptoms of asthenopia. He constantly paid attention to the relation which the state of the ocular muscles bore to the maintenance of comfortable vision; and, in the prescription for glasses insisted upon accuracy in the grinding and the careful adjustment of lenses to correspond to the pupillary centers. He would not consider his attention complete until he had examined the optician's product, and had guided the patient in the wearing of the spectacles, giving directions that repeated opportunities for review should be afforded. Thus, he was an ardent disciple of those principles of modern ophthalmology that have become commonplaces for us today.

He had always dreaded the effects of low degrees of hyperopia, especially in simple astigmatism. In a communica-

tion before the College so late as 1908 the cases he cited included that of a boy, whose parents were hyperopic, and who, at ten years of age, showed a hyperopia of 0.50 D., but who, at fifteen exhibited a myopia of 1.50 D; another, of a boy in a myopic family, whose low degree of hyperopia at the age of ten, soon passed into pronounced myopia. He relied greatly on the presence of the curvilinear reflex at the nasal side of the disk, which he had observed repeatedly while in the active practice of ophthalmology, and which had been so extensively described by Weiss, as a definite and absolute prodromal sign of impending myopic distension of the globe. Weiss believed this brilliant reflex was produced by the ophthalmoscopic beam of light playing on the fluid which had accumulated between the vitreous membrane and the retina at the posterior pole from the pull exerted upon the distended globe by the short optic nerve. In a communication before this College, concerning the effects of myopia, Randall maintained that the presence of this reflex was indicative of pathological processes and should not be classed merely as an anomaly of structural formation. Indeed, he regarded it as more characteristically an index of posterior distension than a conus or other signs could be.

Dr. Randall possessed distinct artistic abilities. He was an expert draughtsman; in his ophthalmoscopic studies during his examinations of students and school children he observed numerous anomalies of fundus formation. These he depicted with great skill and accuracy by pen, pencil, or brush. Notable among his publications were those exhibiting anomalies of the arterial and venous circulations, and colobomata of the nerve and choroid. His pictures, including photomicrographs, added much to the description of the interesting cases he exhibited and published, especially those connected with the abnormalities of lids, iris, and disk, as well as those of the gross and minute anatomy of various tumors.

He was of an inventive turn also, devising an appliance to assist the artist in depicting the eyeground, so that the observer might hold an ophthalmoscope in his teeth while the mirror was adjusted to the eye. This enabled the artist to maintain the mirror before the pupil while the sketching pad was in use. He devised a simple perimeter also, and a trial-frame which afforded adjustments to the interpupillary distance and to the planes of the eyes. He invented a refracting opthalmoscope also, fitted with cylindrical lenses, and a perforated disk to serve as a pupillometer with which to measure the diameter of the pupil.

From the beginning of his practice he routinely employed the ophthalmoscope with which he studied the eyegrounds of all patients. He was expert, and his judgment of conditions observed was most reliable. I recall that when I consulted him for the relief of an acute infection of my middle ear, he made an ophthalmoscopic study of my eyes as well as an examination of my drum membranes. As an instance of his thoroughness in this respect I recall the following incident: A girl of eight or nine years had been at Dr. Norris's Clinic at Wills Hospital for several months suffering from interstitial keratitis of rather mild degree, the visual defect being greater than was inferred from the corneal picture. When she began to complain of dullness of hearing, I was directed to send her to Dr. Randall at the old Polyclinic. On the receipt of his report, all were chagrined to find in it the statement that in the extreme periphery of each retina were the signs of pigmentary degeneration. We, including Dr. Norris, had not observed that symptom.

While Randall was not distinguished as an operating ophthalmic surgeon, he was a careful one and had gratifying success in both public and private practice. He employed Jaeger's "Hohlschnitt" in cataract operation to the exclusion of that with the von Graefe knife. He was a good clinician and knew the value of medicaments in constitutional disease. His practical and clinical observations were based in the beginning on the findings which he had

obtained during his painstaking studies in the refraction and accommodation of the eye. He was a born teacher, always entering enthusiastically into his subject and capable of appreciating the student's point of view. In consultations where otological or cerebral affections and those of the sinuses connected with the orbits were present his service was of the greatest value. He was punctilious to a degree commensurate with the exactions he placed upon himself; he was always kindly, however, and bore with the insufficiencies of lesser men with the utmost patience. One is reminded of his maneuver of employing the aural auscultating-tube to detect the bruit in vascular disease of the orbit, and of his directions concerning the signs distinguishing the prominence observed in ethmoidal cystocele from abscess of the lacrimal sac, which diseases were not infrequently confused so recently as thirty-five years ago, before the perfection of radiography had afforded us the certainty of locating the nidus of either disease. Bacteriology in Philadelphia, about 1890, was in its early infancy, yet Randall under Shakespeare's tutelage employed such means in the diagnosis of the various conjunctival inflammations, and helped to unfold for his colleagues the newer conceptions of the origin of disease.

A perusal of the titles of Randall's communications can show the wideness of his interests. Certain of his discussions are fixed in the literature and no list of the classes mentioned can be complete without including Randall's cases. That which he first published, in the year 1880, was on the subject of the "Mechanism of Accommodation," and one learns that in his post-mortem and histological studies he recorded anomalies that he had discovered in the dissecting-room while still an undergraduate. He could prepare tissues and apply them in sections stained for microscopic definition, all of which was enhanced by the accuracy and beauty of the sketches he made. In the meantime he was building up his private practice, and actively maintained several hospital appointments, all the while penetrating deeper and deeper into otological research.

He was concerned so late as 1913, in ophthalmological subjects and especially those cognate to refraction; in issuing his Test-Cards and Types, he stated that, in the subjective testings of visual acuteness, the entire letters and their separate arms were not the elements producing the minimum of visibility, but, rather the dimensions of the interspaces; observing the glare and other annoying irritations arising from the usual dead-white cardboard on which test letters commonly had been printed, he employed a creamy board. In his studies in refraction he used every device, both instrumental and those connected with subjective testings; which tests in his hands he regarded as the final therapeutic gauge. He patiently and carefully measured the powers of the extraocular musculature and he knew well the relationship of disturbed balance to inherent ametropia. To the end of his days he was cognizant of this relation and had respect for the labors of others in that field of endeavor.

Dr. Randall was ever loyal to his associates. His respect and affectionate regard for Dr. Risley and for Dr. de Schweinitz, not to speak of others, were constantly called out when younger confreres discussed with him subjects which had engaged him and them forty years ago. His reverence for Dr. Norris remained unabated throughout his life, while Dr. Norris's regard for Randall was so great that he, when incapacitated by illness chose him to deliver the lectures and conduct the course in ophthalmological teaching in the University Medical School.

I am not competent to judge what influence Randall as an ophthalmologist had upon otology, yet we can rest assured that he brought to bear upon any discussion concerning affections of the ear the same scientific intelligence that he exercised in the elucidation of problems concerning the eye with which he was confronted both in practice and in theory.

315 South Fifteenth street.

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SIMULTANEOUS COMPARISON IN SUBJECTIVE TESTING

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A method of determining the correct axis of astigmatism by using the cross cylinder in conjunction with the clock-dial cross charts is outlined. The use of the cross cylinder for determining the amount of spherical error is discussed as a feature usually overlooked by ophthalmologists.

Most subjective tests for ametropia depend upon what may be called *successive* comparison. That is, the patient is asked to compare one visual sensation with another that has preceded it. He is really asked to compare one actual experience with the *memory* of another. We do this when on revolving a cylinder we ask, "Is it clearer now? or now?" or when on changing the strength of sphere or cylinder we ask similar questions.

To some extent the accuracy of the patient's answer can be checked by noting what he can read on the Snellen chart with the changed power or new axis position. As a matter of fact, this check often shows how difficult it really is for a number of people to compare accurately one visual impression with the *memory* of another. Furthermore, checking the patient's answers is not only tedious and time-consuming but also becomes of less and less value as the test progresses, since the patient soon becomes familiar with the line or two of letters used in the final stage of the test.

An alternative subjective method which is at present but sparingly used permits a practically complete subjective examination to be made by providing a means of simultaneous comparisons. That is, the patient is asked to compare two or more visual impressions, all of which are present simultaneously. There are especially refined charts for carrying out a subjective examination in this manner more effectively. But the method can be used with the ordinary astigmatic line charts or even with a single chart consisting of a revolving T or of a cross mounted on a dial marked in 5-degree intervals.

Method

Assuming that we have such a cross chart and also an astigmatic fan or clock-dial chart, we first determine roughly the presence or absence of astigmatism by having the patient observe the clock dial and note by comparing the different lines, slowly and repeatedly, if necessary, if any of the lines are plainer or blacker than the remainder. The best results are usually obtained with the patient's vision slightly fogged. But this is subject to wide variations. Sometimes when the patient is fogged by about +1.00 diopter sphere more than his correction he may not observe any difference in the lines, but when the fog is reduced may readily note a difference.

Finding the clearest line and locating its direction will indicate the presence of astigmatism and roughly the direction of the cylinder axis. If the fan or clock chart gives a clue to the astigmatism, we turn to the revolving cross for a more precise localization of the cylinder axis. However, it is sometimes difficult for a patient to pick out the blackest line on the fan or clock chart even though he can compare all the lines simultaneously, simply because he has to compare too many lines. In such cases or when there is no such chart, we can use the cross chart from the very beginning.

We place the cross chart with lines vertical and horizontal and ask the patient to compare the two limbs. If the two appear alike, we turn the cross limbs to 45-135 degrees and again ask him to compare the two limbs. If they now also appear alike we conclude that no astigmatism is present. As previously mentioned, this test is best carried out while the patient's vision is slightly fogged. But if no difference is perceptible the fog should be reduced, even entirely removed, as sometimes in this way a difference in the limbs of the cross not otherwise perceptible is brought to light.

Locating the principal meridians. If astigmatism is indicated, either roughly by the presence of a darker line in the clock chart or by the appearance of a difference in the limbs of the cross in any position, we proceed to locate accurately the principal meridians. We place our cross with its limbs exactly 45 degrees to either side of the direction of the blackest line on the clock chart, or the direction of the blacker limb on the cross chart. Halfway between the cross limbs at each of the four corners a dot or a thin line to serve as an axis-mark should be drawn and the cross so placed that this axis-mark corresponds to the direction of the blackest line. Thus if the blackest lines appeared at 90 degrees, the cross is placed with the axis-mark pointing to 90 degrees. This automatically places the cross limbs at 45 and 135 degrees. The patient is now asked to compare the two limbs, both of which are generally somewhat blurred. If they appear alike, then 90-180 degrees represent the principal meridians. If the two limbs do not appear alike the cross is rotated at intervals of, say, five degrees in the direction of the clearer limb until the two limbs appear alike. If the patient hesitates we may conclude that there is no perceptible difference as far as the patient is concerned and no need for change.

The right axis always lies nearer to the direction of the clearer limb. The cross is therefore rotated so that the axis-mark moves in that direction. Thus if in our illustration the 45-degree limb is blacker, the cross is turned so that the axis-mark moves from its position at 90 to that at 85 degrees, which places the cross limbs at 40 and 130 degrees respectively. If now the limb at 40 degrees still appears blacker or clearer the cross is again turned with its axis-mark towards 40 degrees, placing it, say, at 80 degrees, and the limbs are again compared. This is continued until we get that position of the cross at which the two limbs appear alike. The direction of the axis-mark in our illustration, say, at 80 degrees, then tells us the direction of one of the principal meridians. The other principal meridian is indicated by the axis-mark at right angles, in this case at 170 degrees.

It will be noted that the correct axis is determined by having the patient compare two sets of lines that are seen by him at the same time. He can look from one set to the other, to and fro several times and thereby compare two simultaneous visual impressions instead of comparing one impression with the memory of another. He will generally find it easy after brief observation to note whether the two sets of lines appear alike or not and if not which limb stands out more plainly.

It may be objected that even here the patient compares one impression with the memory of another since he cannot fix with the fovea both sets of lines at the same time. But the intervals here are much shorter, at the pleasure of the patient; they can be rapidly repeated as often as he finds it necessary in order to reach a conclusion. Practically, we may call it simultaneous comparison. But we can also get absolutely simultaneous comparisons by having the patient fix the center of the chart and compare the two limbs by indirect vision. The obliquity is slight and is equally shared by the two limbs and the slight reduction of acuity acts like a low degree of fogging.

Measuring the amount of astigmatism. To measure the *amount* of astigmatism, we turn the cross so that its limbs point in the directions found by the axis-marks; in our illustration, therefore, to 80 and 170 degrees. Of course we need only pay attention to one limb and one axis-mark, the other then takes care of itself. Since the two limbs now lie in the two meridians of an astigmatic eye they must appear unlike. We then introduce cylinders of increasing power with their axes at right angles to the clearest lines, until the two limbs of the cross appear alike. The cylinder which equalizes the limbs measures the amount of astigmatism.

Measuring the spherical error. To detect and measure the spherical error we can use the same principle of simultaneous comparison by means of the cross cylinder. The application of the Jackson cross cylinder for this purpose

seems to have been almost entirely neglected, and yet to the writer this is one of its most important uses. The method of procedure is simply this: With the correcting cylinder in place, we have the patient observe the revolving cross, its limbs at 90-180 degrees. The two limbs have already been equalized by our previous cylindrical correction. A cross cylinder, say, +.50 C.—.50 C. is now inserted in the front cell with the plus power vertical and the minus power horizontal. The patient is directed to compare the limbs. If they appear alike, though somewhat blurred, the patient is emmetropic. If the vertical limb appears blacker, the patient is myopic. We insert minus spheres and the weakest minus sphere that equalizes the limbs measures the amount of myopia. If the horizontal limb appears blacker, the patient is hyperopic. We then apply plus spheres and the strongest plus sphere that equalizes the limbs measures the amount of hyperopia.

The reasons for the above are simple enough. The cross cylinder placed with plus power in vertical meridian and minus power in horizontal meridian produces in an emmetropic eye .50 D. myopia in the vertical meridian and .50 D. hyperopia in the horizontal meridian. As the two meridians are equally defective, the cross limbs will be seen slightly, but equally, blurred. If the patient is myopic, the cross cylinder increases the myopia in the vertical meridian and partly or wholly neutralizes it in the horizontal meridian. The vertical meridian now being the more defective the vertical limb will appear to be plainer. If the patient is hyperopic, the cross cylinder in the position mentioned increases the hyperopia in the horizontal meridian and partly or wholly neutralizes it in the vertical meridian. The horizontal meridian now being the more defective the horizontal limb will stand out more plainly.

Of course the cross cylinder can also be placed with the plus and minus powers reversed in direction and the test similarly conducted. It is convenient to call the lines running in the direction of the plus power, the plus lines, and the lines running in the direction of the minus power, the minus lines. In all cases if the plus lines are clearer, there is too much plus power and minus spheres are required to produce equalization; if the minus lines are clearer, there is too much minus power and plus spheres are required to produce equalization. If, as is usual, the cross cylinder is placed with its plus power vertical and its minus power horizontal the vertical lines are the plus lines and the horizontal lines are the minus lines.

The above description of a complete subjective test involving a method of simultaneous comparison all through will certainly not work equally well in all cases. Every test is affected by the personal equation of the patient and every doctor knows that no two patients are alike. But it is because of this very fact, the variability of patients, that the doctor should have a variety of tests at his command, and the one outlined above is recommended as a sound, reliable method.

Summary

Subjective examinations by the usual methods call upon the patient to make *successive* comparisons between visual impressions. At any one observation he has to compare one visual impression with the *memory* of another. It is possible to make a complete subjective examination and correct both spherical and cylindrical errors by methods which allow of *simultaneous* comparison on the part of the patient. All through the tests the patient can compare two actual visual impressions at the same time. The apparatus required is simply some form of a scaled revolving line-chart such as a cross or diamond and one or two cross cylinders in addition to the usual case of trial lenses.

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OPHTHALMOPLEGIA TOTALIS

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The patient's aspect suggested the diagnosis of myasthenia gravis but exhaustive tests did not confirm it. His condition was finally referred to opthalmoplegia nuclearis congenita. A Reese operation to relieve ptosis improved the visual field and made him socially and industrially more acceptable.

Dr. E. H. Cary, in Ophthalmic Science, 1926, made the following comments in the introduction to the presentation of his case of ophthalmoplegia: "The subject matter is of interest in that it contains a description of a very rare condition. The literature for the past ten years carries a few cases suggesting similarity, in fact, in articles appearing for the past thirty years which deal with Ophthalmoplegia, the subject matter varies with the case and the presentation is largely speculative."

Inquiry by the writer in several large metropolitan eye clinics elicited the fact that patients such as the one about to be described, are very rare. The present subject matter, therefore, is not only of value in that it contains a description of a very rare case, but the surgical measures that were attempted five years ago to help this patient partially to overcome the handicaps which he was obliged to face, and the subsequent five years of practical observation as to their value, make this report of uncommon interest.

Before reporting the history of the case, the following eye findings, which were kindly submitted to me by Dr. Clyde McDannald, should be presented:

"Bilateral ptosis.

"Right eye. Muscles: the superior rectus paralyzed; inferior rectus active but paretic. External rectus paralyzed; internal rectus paretic. Superior oblique paretic; inferior oblique paretic.

"Left eye. Muscles: the superior rectus paralyzed; inferior rectus slightly active. External rectus paretic; internal rectus markedly paretic. Superior oblique slightly active; inferior oblique paralyzed.

"Both eyes are, therefore, almost rigid, with bilateral ptosis.

"The right pupil measured 2 mm. in diameter; the left pupil was oval, 3 by 2½ mm. vertically. The cornea was 12 mm. in diameter. Pupillary reaction in both eyes was positive to light and accommodation, but sluggish.

"Vision, O.D. was 20/200, correcting to 20/24; O.S. 20/200, correcting to 20/40. The left eye diverges 20 prism diopters by actual measurement. Tension in the right eye was 16; in the left eye, 22 (Schiötz tonometer). The fundi were negative.

"Slitlamp examination showed no evidence of pathology. Roentgenological pictures of the nasal accessory sinuses and skull were negative. Blood serum and spinal fluid Wassermann were negative. The studies of the condition afflicting this patient led us to the conclusion that he was suffering from multiple congenital nuclear aplasia of several cranial nerves, the most outstanding of which were those supplying the muscles of the eyes. The diagnosis therefore is ophthalmoplegia nuclearis congenita."

After the diagnosis was established and concurred in by ophthalmologists and neurologists, the author recommended that the lids be raised surgically, which Dr. McDannald kindly carried out, performing a Reese operation for ptosis. After five years of observation, it can be confidently stated that the end results have fully justified the means. During the entire period following the operation, the patient has enjoyed and is still enjoying, a considerable increase in his visual field, since the upper parts of the pupils have been relieved to a great extent of their overhanging curtains. While the patient is suffering from epiphora and slightly enlarged carunculae, neither has been aggravated as a result of the surgery.

Since in his several visits to the clinic he consistently denied having had trouble with his eyes prior to 1918, it may not be amiss to give a résumé of the findings leading to the establishment of the diagnosis which influenced the recommendation of surgical intervention.

The patient was 45 years of age, married and had three children, 14, 12, and 9 years old, respectively. All were well, and showed no evidence of ocular disturbance. His wife had had no abortions.

The patient's mother was alive and well and was about 68 years of age. His father died several years ago from the effects of a fall. The mother had given birth to ten children singly and to one set of triplets, a total of 13 children. Nine children died in infancy or early childhood. One sister was unable to walk and at the age of 18 years died during an attack of influenza. Only one sister and one brother were now alive. They were both younger than the one under discussion.

The patient consistently informed us that, aside from the usual diseases of infancy, he had enjoyed perfect health and had participated in all of the active games of his neighborhood. He recalled when questioned that there were games in which he was unable to compete with some of the other boys; those requiring more than the usual muscular power in their execution. He was a man of moderate education, but with a keen sense of responsibility; had been obliged to earn a living since his fourteenth year. His work had kept him in factories until eight years ago when he was discharged. During his entire adult life his occupation had been that of a factory tailor; that is, he had operated a sewing machine, doing a given kind of sewing. His work had never varied. He informed us that while he was not known as one of the fast operators, yet he had always been able to keep up with the demands, when moderate. In time of stress, however, when an additional effort had to be made, he tired easily and could not keep going. His vision had always been fair; sufficient to carry out his duties. He experienced no visual difficulty while reading, and therefore had had no occasion to consult an eye specialist. He had participated in the affairs of his local union, and otherwise had been an active citizen of his neighborhood. During the "flu" epidemic of 1918 he had been confined to bed for nine weeks with what his attending doctor termed "influenza." He did not know that his eyeballs were rigid until about ten years ago when a fellow worker called his attention to the fact.

Fig. 1 (Poe). Before operation for ptosis. A maximum attempt at looking upwards, with head titled and forehead wrinkled. The eyeballs remained practically in the same position as when looking forward. The lids covered the greater part of both pupils, particularly the right. The visual field was small. The patient could not look without tilting his head correspondingly upward.

When the patient presented himself at the clinic his physiognomy exhibited the singular appearance induced by myasthenic paralysis (myasthenia gravis). Five years previously his condition had been diagnosed as such and it was with a view to establishing this diagnosis that our investigation was first directed. There was a definite diplegia facialis in addition to the ptosis, as is well shown in the photographs. Muscular exertion seemed to tire him; his walk lacked springiness. He had a sort of bulbar speech, slurred and nasal. There was a slight conjunctivitis as well as epiphora, and some mucus issued from the corner of his mouth. Indeed, his face and his bearing seemed to carry the characteristic stamp of pseudo-bulbarparalytica.

The exhaustive neurological exam-

ination to which the patient was subjected did not bear out the presence of myasthenia gravis.

The patient further informed us that since the attack of influenza, his movements generally had not been as rapid as they were before the attack. This would suggest a possible present or past encephalitis. Clinically we were unable to establish the existence of a chronic encephalitis. Of course, being unable to establish a disease clinically does not rule out its existence; however, the various tests and examinations to which the patient was subjected justified our assumption that we were not dealing with an encephalitis in the accepted meaning

Fig. 2 (Poe). Before operation. Eyes in position when the patient looked forward. The left eye diverged 20 prism diopters.

of the term. Nevertheless, muscular movements were not made with the quick precision expected in a normal person. Movement of the head particularly was reduced in promptness and facility. Muscular power in the grip was reduced. This was, in all probability, due to lack of muscular development, since he had never been athletic nor had his occupation been such as to develop strong muscles.

Babinsky and Oppenheim reflexes were both negative, and responses to muscular and sensory reflexes were sluggish.

A very interesting clinical phenomenon observed in our patient was the behavior of the eighth cranial nerve. Hearing was reduced in perception of pitch as well as in duration of tone, while the reaction to turning in the Bárány chair was also markedly reduced. After turning in the usual manner in the horizontal plane there were no more than six to nine nystagmoid jerks, no pastpointing, and no perception of dizziness nor nausea was experienced. Turning in the saggital or frontal plane produced a minimum of reaction. The reaction in the saggital plane produced the greatest amount, but not nearly as much as the average normal person experiences. There was slight pastpointing in the frontal and a fraction more in the saggital plane. There was almost complete absence of dizziness and nausea in the horizontal while the reaction to turning in the saggital plane was only slight. Recovery was unusually rapid. The patient was subjected to the Bárány turning test for over one hour on several occasions, but at no time did he experience a sufficient degree of ill effects to interfere with his leaving the hospital with entire composure shortly after the tests were completed.

The first nerve also showed a marked decrease in responsiveness to the recognition of ethereal odors. While the odors were recognized in due time, a lapse of almost one to ten seconds would take place before recognition occurred. The tests were made using several physicians and nurses as a normal standard. The patient's responses were always delayed. At least fifteen tests were made at varying intervals ranging from one day to two months. When the odor was in such dilute concentration that the patient could not perceive it, the normal person experienced no difficulty in recognizing the same. We were undoubtedly dealing with an olfactory organ that was below normal in function. Whether the lowered physiological function occurred in the nasal epithelium, in the olfactory nerve or tract, or in the final cerebral termination of the organ, is naturally difficult to say.

Sensory recognition in the territory of the three branches of the trigeminal was also somewhat reduced as compared with the normal. Especially fine point pricks, and the delicate streaking of the skin with a camel's-hair brush passed prompt recognition. Heat and

cold seemed to be quickly recognized. We were obliged to assume that responses of the trigeminal nerve were not as acute as we have become accustomed to find them in the normal person.

Pharyngeal, laryngeal, and tracheal reflexes also appeared to be reduced in comparison with the normal.

His body disclosed multiple lipomas especially about the waistline. The patient states that he is quite positive that he had never had any such or similar swellings, as he called them, about his body before the attack of encephalitis. If that is correct we have an interesting phase of the derangement of fat metabolism with a manifestation of lipomatosis induced by this ailment.

The patient attempted to place most of his troubles as arising after the attack of la grippe yet a thorough investigation has definitely established the fact that long before this attack he was not as strong physically as other boys of the same age with whom he associated. Early photographs showed him to be thin, underdeveloped, and possessed of a marked ptosis. His was unquestionably a congenital condition.

Until eight years ago when economic conditions were good, he had had no difficulty in obtaining employment, but as soon as the demand for labor decreased he was discharged and, as a result, drifted from pillar to post hunting and pleading for work. Prospective employers rejected him as soon as he was interviewed. They were under the impression that he was either sleepy, tired or that nature had afflicted him with poor vision. The drooping eyelids were responsible for much of his economic troubles. He was unable to obtain any work for over three years. It was just to give the patient a greater chance for a hearing among prospective employers that the thought occurred to the writer to recommend the permanent surgical lifting of the lids to which he immediately agreed.

Very shortly after Dr. McDannald carried out the Reese operation to correct ptosis, an ulcus cornea developed on the left eye. The epiphora continued. In the course of one month the ulcus cornea healed and the epiphora decreased. The patient now has a much greater field of vision, his appearance is improved and as a result he is more favorably received by prospective employers. Whereas he and his family were a continual public charge for three years until the correction took place, since the operation he has supported his family and himself by working at his trade until recently when the factory closed as a result of the present severe depression.

Summary. The patient was under observation for six years, and for nearly five years after the correction of the bilateral ptosis.

Fig. 3 (Poe). After the operation for ptosis. The pupils of both eyes are cleared of their overhanging lids, increasing the visual field in all directions.

Bilateral ophthalmoplegia such as affects this patient is a rare disease: The extrinsic muscles of the eyes show evidences of either paresis or paralysis. The response of the intrinsic ocular muscles especially of the pupillary reflexes is sluggish. There are no evidences of any of the muscles *per se* being affected. We have reasonably conclusive evidence that the ocular nerves, either in their nuclei or in their extent, are affected. Clinical observations would tend to lead us to the belief that the nuclei are hypoplastic.

Other cranial nerves, particularly the 8th, which lends itself beautifully to objective findings, were shown to be reduced in their response to external stimuli.

Gross muscular strength is reduced but there is no clinical evidence of muscular degeneration.

The seventh nerve, while not paralyzed, is markedly reduced in its action.

The patient was unable to obtain employment because his facial appearance, particularly the ptosis, produced an unfavorable impression. That eventually became a serious economic problem both to the patient and to the community.

The surgical correction of the ptosis gave the patient a greater field of vision, improved his appearance, and as a result he was more comfortable socially and more favorably received by employers. After five years of observation we feel that the subsequent results have justified the surgery.

Since the pathology underlying this case can only be speculative at this writing, I shall defer discussing it to another period.

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LENS REMOVAL FOR HIGH MYOPIA

Results in ten eyes

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Unless the sight is kept centered through high-power concave lenses, a disturbing prismatic effect is experienced by the myopic patient. Such lenses also reduce the apparent size of the object, and thus limit vision. The author's method of lens removal has been successful in improving sight, and theoretically he believes that it should tend to check the progress of the myopia.

This report is intended to be merely a recital of personal experiences, hence no review of the literature will be attempted. The results speak for themselves and show that the procedure is well worth while in suitable cases.

There are several drawbacks to the use of high concave lenses. One is the difficulty of keeping the lines of sight through their exact centers. This is desirable because any deviation causes a marked change in focus and produces a correspondingly marked prismatic effect. One-half millimeter of decentration causes one degree of prismatic effect. This is very important especially in the vertical direction. Another drawback is that high-power minus lenses make objects appear smaller, thus reducing the vision. The elimination of this factor accounts for the improvement in vision following operation.

There are differences of opinion concerning the effect of lens removal on the progress of myopia. It seems to be generally accepted that a continued full correction of myopia tends to check its increase. It would seem reasonable to expect that the operative cure of the condition would have the same effect. The absence of accommodation, after operation, forces the use of the eyes at a greater distance (the focal distance of the reading correction). This, theoretically, should also tend to check an increase.

In one of my cases, seen six years after operation, there had been no increase in myopia and in three others, operated on many years before coming under my care, there had been none. Such results are suggestive, although it must be admitted that the myopia might have reached its limit before operation.

In monocular high myopia, such as in case 2, its correction permitted binocular vision with entire relief from a headache which had been constant.

For the technic of operating I would refer to the very complete account in Török and Grout's "Surgery of the Eye." Three points should be emphasized: 1. The discission puncture should be subconjunctival, as emphasized by Jackson. 2. The pupil must be kept widely dilated till all lens matter is absorbed. 3. In patients too old for

discission the lens can be more safely removed from under an undetached conjunctival bridge after a preliminary iridectomy.

Case reports

Case 1. Mrs. Y. S., aged 49 years, was in the hospital for some chronic complaint and had not been studied from the refractive standpoint before operation. She was bedridden and all the operative work had to be done in the ward. She was wearing for the right eye a —23 D. sph. and for the left a —20 D. sph. She was tremendously fat and had very protuberant globes.

On August 9, 1918, a preliminary iridectomy was done, the patient proving to be most unruly. On the 19th, at 8 a.m. she underwent a preparatory capsulotomy (Homer Smith method), and the lens was extracted at 5:30 p.m. on the same day. A Kuhnt bridge flap was first prepared and the sutures placed, lid retractors being used instead of a speculum. The lens came out leaving but little soft cortex behind. No loss of vitreous occurred. Healing was uneventful. On September 17, 1918, the pupil was black and sight very much better. She remained in the hospital for a long time but for some unknown reason never came to the office for refraction. The mechanical result was most excellent.

Case 2. Mrs. J. E., 28 years old, complained of severe headaches with pains in the eye balls that made her "sick all over." Refraction: O.D. with —21 D. sph. vision = 20/60; O.S. with plano vision = 20/20. No hope was offered for relief from the headaches by operation. Needlings were done on January 24 and February 4, 1920, and on February 12 a washout was done because of hypertension. On April 27, 1920, the media were perfectly clear and fundus details focused with no lens. On June 28, 1920, vision with the correction of a —2 D. sph. = 20/30 full. When seen on November 30, 1920, she reported having had no headaches since the operation except when she had gone without glasses. On June 16, 1926, the results were unchanged. There was a faint pupillary membrane which reduced the vision slightly.

Why did the headaches stop?

Case 3. A. C. W., aged 38 years, had had both lenses removed by Dr. Ogilvey in England in 1904—sixteen years before consulting me.

Refraction: O.D. had a dense membrane. He was wearing a +7 D. sph. O.S. with +8 D. sph. vision = 20/20. On July 17, 1920, the membrane in the right eye was needled. Two days later there was an hypopion with severe pain. The patient had a sore throat with neck pains and had probably been incubating an acute cold on the day of the operation. Luckily it was not a pus infection because it cleared up. When last seen on January 7, 1921, his vision was 20/60 with a +4.50 D. sph. ⊂⊃ + 1.00 cyl. axis 105°; the media were crystal clear. This patient, when operated upon, must have had a myopia of less than minus 15.

Case 4. Mrs. E. E., aged 30 years required O.D. —23 D. sph. to give vision of 8/100; O.S. with —22 D. sph. vision = 8/100. The lens of the right eye was needled on February 14 and on March 9, 1921, and on March 10 a washout was done because of hypertension. The nucleus came out as quite a large single mass. Absorption of the remaining cortex was slow. On August 8, 1921, the remaining membrane was needled. On August 25, 1921, vision was 20/80 with a —4.50 D. sph., and without any lens the patient read type .75 D.

On October 1, 1921, the left lens was needled. Because of the good result in the other eye the cortex was permitted to take its own time to absorb. This had occurred by Febuary 9, 1922, on which date the vision corrected to 20/40 partly. In June of that year the pupillary membrane was cut with a Noyes scissors. On July 5, 1922, the vision was 20/60 plus with a —4.50 D. sph.

It will be noted that the eyes took exactly the same correction. With it they were orthophoric. Without it she read very comfortably. At this time she disappeared from observation. In her case the fundus changes were so marked that such excellent visual results seemed out of the question.

Case 5. J. K., 28 years old, was wearing: O.D. —19 D. sph.; O.S. —16

D. sph., and no change was accepted. With these glasses, vision was 20/150 in each eye. There were the usual changes about the nerve, the maculae being in relatively good condition. On March 22, 1929, the right eye was needled and again on April 8, 1929. On the 12th a partial washout was necessary. The remaining cortex gradually absorbed until on July 17 his vision was 20/40 with a plano lens.

On January 16, 1930, the left eye was needled. Again this eye was given plenty of time. Two more needlings were done on June 11 and August 16, respectively, the final result being 20/40 partly with a +3 D. sph.

Conditions were the same on the day of the last visit (May 9, 1932). Both pupils were practically round and reacted freely to light.

Case 6. Mrs. J. K., aged 26 years. The right lens had been removed by Dr. Callan of New York in 1917 by the needling method.

Refraction: O.D. +.50 D. sph. $\bigcirc$ —2.00 cyl. axis 60°, vision = 20/50 partly. O.S. —20 D. sph. $\bigcirc$ —2.00 cyl. axis 120°, vision = 20/200. The right macula showed degenerative changes; the details of the left could not be made out clearly. There were the usual changes about both nerve heads. On April 13, 1931, the first needling was done, and two weeks later a more thorough one. On June 23, 1931, there was a third needling. After this, absorption proceeded slowly and was complete by December 11, 1931. On January 11, 1932, the refraction was: O.D. +.50 D. sph. $\bigcirc$ —2.00 cyl. axis 60°, vision =20/50—; O.S. +.75 D. sph. $\bigcirc$ —2.50 cyl. axis 175°, vision = 20/50—. This patient never had any redness nor any reaction after any operation, which probably accounts for the slowness of absorption. She had a round pupil reacting to light.

With an additional +3.50 D. sph. she read type .75 D. slowly which was better than with the right eye.

It will be noted that there were no failures and that all the eyes were in a much more useful condition following operation.

I think if spectacular slap-dash methods are not used, one has every reason to expect consistently good results in suitable patients.

450 Sutter street.

RECENT OBSERVATIONS ON THE PROLONGED OCCLUSION TEST

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This is a reiteration of the value of the prolonged occlusion test together with a table giving the author's findings over a period of years. He discounts the adverse results obtained by Abraham and by Beisbarth on the ground of inadequate procedure.

Although many of the tests recorded by Beisbarth in a paper published in the November number of the Journal can scarcely be classed as prolonged occlusion tests—20 out of 29 varying in duration from one hour to twenty-four only—and although the contention of Abraham, that this test is a method of demonstrating Bell's phenomenon and not a test for heterophoria, cannot be taken seriously, it is evident that the emphasis they lay upon the apparent tendency of an eye under occlusion to turn upward is a matter of considerable interest. Its precise importance must be determined by further research, the number of cases upon which their thesis is based being too small and their observations on the effect of occlusion too incomplete to allow reliable conclusions to be drawn from them.

The question they have raised has stimulated the writer to review the statistics of the 700 cases upon which his monograph* published in 1924 was based, as included therein, and to see what light they throw upon the subject. In this series the nondominant eye was selected for occlusion as a rule, the exceptions being those cases in which vision was better in one eye than in the other, in which case the eye with the lower vision was covered. As right-handedness and right-eyedness usually, but not quite always, go together and as statistics show that left-handedness occurs in from five to seven percent of the population, it may be assumed that left-eyedness occurs in about the same percentage. Therefore, allowing for an occasional case in which the selection depended upon difference in vision, it is fair to assume that the left eye was occluded in about 90 percent of these cases.

The following table shows what actually happened.

Table I

CHANGES IN HYPERPHORIA

After occlusion of left eye in 90 percent and of the right eye in 10 percent

Preocclusion conditions	No. of cases	R. Hyperphoria developed	L. Hyperphoria developed	No change	R. Hyperphoria increased	R. changed to L.	Decrease	L. Hyperphoria increased	L. Hyperphoria changed to R.
Orthophoria	154	43	72	39					
Exophoria	104	29	56	19					
R. Hyperexophoria	64			12	25	15	12		
L. Hyperexophoria	99			13			18	59	9
R. Hyperphoria	74			13	29	19	14		
L. Hyperphoria	72			12			9	42	9
Esophoria	55	21	21	13					
R. Hyperesophoria	44			8	12	13	11		
L. Hyperesophoria	34			6			8	15	5

Considering in the first place the whole number of cases of hyperphoria *before* and *after* occlusion and ignoring the lateral deviations which usually accompanied them, we have: *before* occlusion 387 cases, of which 182, or 47

* The relative position of rest of the eyes and the prolonged occlusion test. F. A. Davis Co., Philadelphia, Pa. 1924.

percent, were cases of right and 205, or 53 percent, of left hyperphoria; *after* occlusion 574 cases, of which 219, or 38 percent, were cases of right hyperphoria and 355, or 62 percent, left hyperphoria. In other words the percentage of left hyperphoria had increased by 9 percent.

If the selection of the left eye for occlusion had all the influence attributed to it by the above authors it would be reasonable to expect a far greater increase in the number of cases of left hyperphoria. When these cases are examined in detail the evidence tends to show still more definitely that it is possible to attribute too much importance to it.

Thus in 154 cases of preocclusion orthophoria in which the left eye was occluded (that is in about 90 percent of them) right hyperphoria developed in 43 cases and none in 39. That is to say, that in 82 cases, or 53 percent, covering the left eye not only failed to produce left hyperphoria but in 43 cases it was followed by right hyperphoria. In 72 cases, or 46 percent, it was followed by the manifestation of left hyperphoria. If the eye selected for covering were the main determining factor as to the kind of hyperphoria revealed, then the cases of left hyperphoria should have approximated 138 after occlusion.

Referring again to the table we see that there were 55 cases of pure esophoria *before* occlusion, and that *after* occlusion right hyperphoria developed in 21 cases and left hyperphoria in 21 cases. In 13 cases no hyperphoria developed. In other words, there were 34 cases or 62 percent in which left occlusion failed to produce left hyperphoria.

Again, of 74 cases of right hyperphoria, the hyperphoria remained unchanged in 13 cases, increased in 29, changed to left in 19 and decreased in 14. In other words, left occlusion failed to cause a trend towards left hyperphoria in 42 cases, or 56 percent.

Similarly in 72 cases of pure left hyperphoria the hyperphoria remained unchanged in 12 cases, decreased in 9, changed to right in 9, and increased in 42, or 58 percent.

Although the statistics in this series of cases lack mathematical accuracy on account of some uncertainty as to the exact percentage of relative occlusion, it is evident that they do not lend much support to the contention of Beisbarth and Abraham.

During the past two years 82 cases, presented here in tabular form, have been examined by the writer and his son, Dr. S. B. Marlow, by alternate occlusion of each eye, the desirability of this procedure having been confirmed by a personal communication from Dr. James Watson White, of New York. The limitation in the earlier cases of occlusion to one eye only was due to the idea that a radical distinction should be made between cases in which the insufficiency was due to paresis, and those in which it was due to some other cause. In the former case it was obvious that there would be a difference according to which eye was covered. In insufficiency due to causes other than paretic it was thought that the difference would be negligible. Further consideration and experience have shown that any insufficiency, whatever its cause, would have much the same effect in its manifestations during examination. The conclusion therefore is that all cases must be subjected to alternate occlusion and not the questionably paretic ones only. The results tend to show that, while in a great many cases there is a tendency in an occluded eye to deviate upwards, there are a great many exceptions, and that the degree of deviation is usually different on the two sides. Beisbarth's contention that the covered eye *always* deviates upwards is not confirmed by these statistics.

The table shows that with the *left* eye occluded and the *right* eye fixing, *left* hyperphoria developed in 57 cases, *right* hyperphoria in 17 and no hyperphoria or one varying from right to left in 8. That is to say, that left hyperphoria failed to follow left occlusion in 25 out of 82 cases, roughly in one in three.

With the *right* eye covered and the *left* eye fixing, *right* hyperphoria developed in 44 cases, *left* hyperphoria in 22 cases and no hyperphoria in 16 cases. That is to say, that right hyperphoria

failed to follow right occlusion in 38 out of 82 cases or in a little less than one half the number.

In the 26 cases of preocclusion orthophoria, occlusion of the left eye produced 19 cases of left hyperphoria, 4 of right hyperphoria, and 3 of orthophoria; and occlusion of the right eye 14 cases of right hyperphoria, 4 of left hyperphoria, and 8 of orthophoria.

In 49 out of the 82 cases, the hyperphoria was of the same kind but of different degrees on the two sides, giving evidence of unequally defective, vertically acting muscles on the two sides; and finally there were 23 cases in which the hyperphoria was of the double, alternating type.

In every one of these 23 cases the covered eye deviated upward. It can scarcely be doubted that here we have a vestigial condition, a reversion to an earlier evolutionary type. According to Stevens, sometimes the eye covered deviates downwards, instead of upwards. This authority, however, refers only to cases in which a brief occlusion, shifting the occluding card from one eye to the other, demonstrates an alternating vertical deviation.

Just as with other forms of heterophoria, the presence of which cannot be demonstrated without a prolonged occlusion test, there are many cases in which a double alternating hyperphoria can be revealed only by a sufficiently prolonged test of this kind. These findings, with those of Abraham and Beisbarth, make it probable that on the whole there is a greater tendency in the covered eye to deviate upward than the reverse, as previously stated, and this is in keeping with the findings in the monograph.

In the 700 cases on which it was based, the left eye was occluded in most cases, that is in about 90 percent, and left hyperphoria was in the majority by 62 percent. Cases of reversal from right to left hyperphoria were 44½ percent and from left to right 25 percent, in cases of pure hyperphoria before occlusion.

Probably the limitation of occlusion to one eye in this original series of cases would account for some of the failures to obtain relief, which however were in a very small minority, and the practice of alternate occlusion as recommended in The Technique Paper would have eliminated some of these failures.

The following cases illustrate the value of the occlusion test and the impossibility of solving many asthenopic problems without it.

(1) The first case illustrates the failure of refractive correction alone in a patient with orthophoria (sometimes esophoria) over a period of thirty years and the rapid solution of the problem by a prolonged occlusion test.

This patient came under observation in 1888, when she was 18 years old, on account of lifelong headaches and asthenopia. Examination showed a low degree of hypermetropic astigmatism and esophoria of 9°. She was given a +0.50 D.cyl. axis 90° for each eye, and experienced some relief. In 1890 the esophoria had gone down to 3°.

Between this date and 1915, various changes were made in the glasses corresponding to the varying refraction. At the latter date she showed at some tests a low degree of right hyperphoria and sometimes orthophoria. At no time did she get satisfactory relief from her symptoms which included such an annoying mental attitude that she was asked at one time to see some other doctor, which she declined to do, to the regret of the writer at the time.

In 1917 and 1918 tests showed orthophoria. Her symptoms were much worse, in spite of an apparently accurate refractive correction, and it then occurred to the writer that she might have some latent muscle imbalance and the left eye was occluded for a week bringing out 6° of exophoria and 1¼° of left hyperphoria. She was given a correction of ¾° for hyperphoria and 3° for exophoria. Two years later she came back and said, " I want to tell you that the only two years of comfort I have had since I first came to you, which was 32 years ago, have been since you covered up one of my eyes."

The case is of further interest because 13 years later (1931), a return of symptoms followed great overuse of her eyes and was unaccounted for by

any demonstrable change in refraction or muscle balance. An occlusion test was advised. This time an alternate occlusion was done, first of the left eye for four days developing *left* hyperphoria 2°—2½° and exophoria 5°. Then an occlusion of the *right* eye for five days showed again left hyperphoria 2°—2½° and exophoria 5°. In other words it made no difference which eye was covered. Relief again followed a further correction of the imbalance. (R. 2°, base in; L. 2½°, base in, down 35° with refractive correction.)

It is noteworthy that the main difference between the results of the tests made with an interval of thirteen years was the demonstration of a somewhat higher degree of hyperphoria.

(2) In another case, a patient, the subject of headache, unrelieved by the correction of her refraction, had been under observation for seventeen years. The last ten years she had shown about 1° of left hyperphoria, the correction of which did not relieve her. The left eye was finally occluded. Then the hyperphoria (L) went up in twenty-four hours to 5°, reaching 6° at the end of four days. The right eye was then occluded and the hyperphoria (L) came down at the end of three days to 1⅓°. The cover was then shifted back to the left eye and the hyperphoria (L) went up the next day to 7°. It seems safe to say that this higher deviation should be regarded as the secondary deviation, and the former low degree as the primary, indicating an insufficiency of the right elevators. Testing the sursumduction showed the left sursumduction to be 7°—8° and the right sursumduction a minus quantity indicating again an insufficiency of the right elevators. Diagnosis made was insufficiency of the right superior rectus and right inferior oblique, both third-nerve muscles. In this case whichever eye was covered developed a left hyperphoria, much greater on one side than on the other. Prisms correcting 3° of hyperphoria stopped the headaches.

(3) Again, in a patient suffering from neurasthenic symptoms of an unusually severe type, an ordinary test showed orthophoria. Covering the left eye brought out 3° of left hyperphoria in five days with complete relief from all symptoms. Changing the cover to the right eye was immediately followed by right hyperphoria ½°, 0°, 1°, on three consecutive days with the return of all symptoms. On changing the cover back to the left eye a left hyperphoria of 3° again developed with relief from symptoms. Regarding the left hyperphoria developed when the right eye was functioning as the secondary deviation, the localization of the insufficient muscles in the right eye would seem to be indicated. This makes it difficult to understand why the symptoms should be relieved when the right eye is functioning and why they should return when the left or normal eye is used. Again, testing the hyperphoria in four oblique positions indicated an insufficiency of the left inferior rectus but this is inconsistent with the fact that the hyperphoria disappears when the left eye is functioning. It should be greater. An insufficiency of the right elevators would seem to afford a better explanation of the findings. This patient showed also an exophoria 4°. Prismatic correction of 2½° of left hyperphoria and 2° of exophoria gave complete relief in spite of the incongruity of the findings.

(4) Another patient being right-handed but left-eyed showed at the preocclusion test, left hyperphoria 1°, the prismatic correction of which gave relief for two months only. The *right* eye was then occluded and an increase in *left* hyperphoria going to 6° in nine days followed. The selection of the right eye for occlusion in this case was due to the vision being markedly less than that of the left eye.

(5) In another patient, showing at the preocclusion test, right hyperphoria ¾° and exophoria 3°, the left eye was covered bringing out left hyperphoria 3° and exophoria 9° in four days. The right eye was then occluded bringing the left hyperphoria down to 1° after three days, the exophoria being 10°. Tests in the oblique positions showed right hyperphoria looking to the right and left hyperphoria looking to the left, evidently a double hyper-

phoria, greater on one side than on the other.

(6) Mrs. H. H. K., from early childhood the subject of headache localized mainly in the occipital region accompanied by pain in the neck, while in high school was prescribed glasses which did no good and were discarded. At the age of seventeen she had severe gastric disturbance lasting a year, nausea and vomiting, inability to retain food, her condition being variously diagnosed as ulcer of the stomach, or cancer. These were finally decided as due to nervousness and over work, in addition to taking care of a sick mother. She had consulted various physicians and three oculists without any benefit. Her symptoms were daily headache with occasional nausea, head never feeling clear, photophobia, asthenopia, and nervousness. Examination showed low hypermetropia and astigmatism, (approximately corrected by glasses prescribed three months previously) and orthophoria. Occlusion of the right eye for nine days brought out right hyperphoria 6° and exophoria 6°, her symptoms being relieved during the occlusion. Prisms correcting 3° of hyperphoria and 3° of exophoria incorporated in the prescription gave complete relief from all symptoms which is maintained at the end of two and one-half years.

(7) This patient suffered from nervousness "affecting the stomach and back," vertical and occipital headache, severe asthenopia, and photophobia. Examination showed emmetropia and orthophoria before and after cycloplegia. The left eye was occluded seven days, at the end of which time there was a left hyperphoria 1½°, exophoria 4½°. Prisms correcting hyperphoria 1¼° and 3° of exophoria were prescribed. Six months later she reports herself quite well, stomach normal, had gained ten pounds and had no asthenopia.

(8) Patient had headache, photophobia, and nausea, and is of interest because a *left* hyperphoria of one degree at the primary test disappeared after occlusion of the *left* eye for one day, being replaced at the end of five days by *right* hyperphoria of 1°. The occlusion was then shifted to the *right* eye and at the end of four days there was still a *right* hyperphoria of 1°. At the preocclusion test there was esophoria of 3°, which changed to exophoria 3° during occlusion. Prismatic correction of ¾° of right hyperphoria and 1½° of exophoria gave complete relief.

The foregoing cases are typical of the effect of prolonged occlusion and in no way exceptional or unusual.

(9) Occasionally the prolonged occlusion test is the means of eliminating prismatic correction previously prescribed. Thus Miss E. L. K. the subject of severe asthenopia, photophobia, and so forth, was wearing glasses approximately correcting her refraction and including a prism 1°, base down, before the right eye. At the preocclusion test there was right hyperphoria 1½°. A four-day occlusion resulted in perfect orthophoria and a more accurate correction of her refraction alone, gave complete relief.

(10) A week's occlusion is not always sufficient to render a phoria manifest. Thus in the case of Mrs. G. a seven-day occlusion test, L. eye, carried out at the age of 23 (1913) on account of daily headache, brought out no hyperphoria and less than 2° of exophoria. A correction for a low degree of astigmatism gave some relief. In 1933 on account of persistence of headache and physical fatigue another occlusion test was advised. With the left eye covered, left hyperphoria 2° and exophoria 6½° developed in five days. Then covering the right eye produced right hyperphoria 1° and exophoria 9½°. Changing the occlusion again to the left eye was followed by L. hyperphoria 2° and exophoria 9°.

Prescribing for the hyperphoria found after an occlusion test is not always a simple matter. It cannot be decided by a reference only to the amount of error found in the primary position at 6 M., though that, perhaps, is the most important or basic factor. The decision must be controlled or modified by a comparison of the sursumduction on the two sides, the distribution of the error over the field of fixation, and the difference brought out by alternate occlusion. In those cases in which there is

a right hyperphoria on one side and a left on the other, of different degrees, the writer has found it advantageous in the limited number of cases in which he has applied the principle, to take both into consideration. It seems safe to assume in such cases that the eyes are in a more restful position when turning above the plane of the horizon, the condition described by Stevens under the term anaphoria, but that in addition the deviating tendency upwards is greater on one side than on the other. Therefore the glasses prescribed should take both phenomena into consideration. To take, as a concrete example, a case with right hyperophoria 3° when the right is covered and left hyperphoria 1° when the left is covered: It is evident that there is a tendency in each eye to come to rest above the plane of the horizon, in the case of the left eye 1°, in the case of the right eye 3°, or the right has a tendency to rise 2° higher than the left; that is, an anaphoria of at least 1° and a right hyperphoria of 2° in addition. The anaphoria would be corrected by 1°, base down, over each eye and the right hyperphoria by the addition of 2°, base down, over the right eye. The prescription therefore would be, if for full correction, seldom desirable on account of other factors, right 3° base down, and left 1°, base down. The aim should be to secure a better average balance over the field rather than a perfect balance in the primary position.

When the glasses are finally prescribed the patient may still have a different hyperphoria, alternating, on the two sides, and a fairly good balance in the primary position. Experience alone can furnish a safe guide in this matter. Some cases present anomalous conditions which cannot be satisfactorily met by any glass, and in others, although an adequate cause may be found for the symptoms, it may not be the true cause or the most important factor in the causation.

Many authors lay much stress on the vertical deviations and tend to ignore the lateral. The writer is inclined to differ from this attitude and to think that both should be taken into consideration, the lateral being often of as much and sometimes of more importance than the vertical.

The fact that the test has been weighed in the editorial balance and found wanting is to be regretted, as it may deter some from using what many ophthalmologists of undoubted ability have found of great value. Its precise value will necessarily vary with the degree of care which the examiner exercises as to detail, his ability in interpreting the findings and in applying the knowledge so found in prescribing, and perhaps one should add the attitude of mind of both doctor and patient towards it. It cannot be denied, however, that if the observations recorded by Abraham and Beisbarth are to be accepted as prolonged occlusion tests the decision that the test is of "doubtful value" would be difficult to controvert.

To be specific in criticism: Experience with the test over a period of 40 years indicates that their cases are too few in number, too short in duration, and the procedures themselves too incomplete to justify any conclusions as to its value being drawn from them. They make no reference to the lateral deviations, which are often of as much and sometimes of more importance than the hyperphoria. Neither is there any reference to the phorias at the near point, the relative sursumduction—very variable under alternate occlusion—the deviations in the four oblique positions, nor a comparison of the hyperphoria on the two sides by alternate occlusion. The value of the test cannot be determined by the estimation of the hyperphoria alone at 6 M.

On one side of the balance there are the thousands of cases investigated and reported on by O'Connor, Barkan, O'Brien, the writer, and others, and the experience and expressed opinions of deSchweinitz, Holloway, Fuchs, Kirby, Peter, and many others; on the other side the observations of Abraham and Beisbarth. The criticisms of Duane and Maddox were not based on actual experience with the test but upon theoretical considerations alone.

Only actual experience obtained by using the test with meticulous care as to detail in a sufficient number of cases

Name and case number	Preocclusion Phoria	Master Eye	Left Occluded		Right Occluded		
			Period	Phoria	Period	Phoria	
S.A.W. A-7916	Ortho.	R.	(1) 6 days	L. Hyp. 3° (Ex. 2°)	(2) 3 days	R. Hyp. 1°–0° (Ex. 4°)	L. occluded (3) 4 days L. Hyp. 2½° Ex. 2°
W.D.G. A-662	Ortho.	R.	(1) 9 days	L. Hyp. 3°	(2) 9 days	Hyp. 0 Eso. 2°	
R.V.A. A-8581	Ortho.	R.	(1) 6 days	L. Hyp. 2° (Ex. 8°)	(2) 3 days	L. Hyp. 1° (Ex. 9°)	
D.S.M. A-8439	R. Hyp. ½°— Ex. 3°	R.	(1) 9 days	R. Hyp. ½° (Ex. 7°)	(2) 4 days	R. Hyp. ½° (Ex. 4°)	
O.T. A-7617	R. Hyp. ½° Ex. 3°	R.	(1) 8 days	R. Hyp. ½° (Ex. 4°)	(2) 3 days	R. Hyp. 2° (Ex. 4°)	
J.S. A-7995	Ex. 1°	?L.	(2) 10 days	R. Hyp. 2½°–1½° (Ex. 5°)	(1) 8 days	R. Hyp. 5° (Ex. 7°)	
J.B. A-8461	R. Hyp. ∠½°	R.	(1) 7 days	L. Hyp. ¾° (Ex. 2°)	(2) 8 days	R. < ½°– (Ex. 2°)	
E.W M. 75.97	Ortho.	R.	(1) 6 days	Hyp. 0° (Ex. 5°)	(2) 7 days	R. Hyp. 0° to 1° (Ex. 5°)	
R.C.P. 2679	Ortho.	R.	(1) 7 days	L. Hyp. 1¾° (Ex. 1°)	(2) 3 days	L. Hyp. ½° (Ex. 1°)	
L.W. A-8489	L. Hyp. ¾°	L.	(2) 5 days	L. Hyp. 3½° (Ex. 8½°)	(1) 8 days	L. Hyp. ¾° (Ex. 7°)	
H A V. 3473	L. Hyp. 2° Ex. 5°	R.	(1) 7 days	L. Hyp. 3° (Ex. 8°–10°)	(2) 3 days	L. Hyp. 1° (Ex. 10°)	
K.W.W. A-8417	L. Hyp. 1°	?L.	(2) 7 days	L. Hyp. 1½° (Ex. 6°)	(1) 6 days	L. Hyp. 1° (Ex. 8°)	
R.E.D. A-8688	L. Hyp. ½°— Low Eso.	R.	(1) 7 days	L. Hyp. 1°– (Eso. 5°)	(2) 3 days	R. Hyp. 1° (Eso. 5°)	
B.T. A-8718	Ex. 1°—2° R. Hyp. 2°	R.	(1) 5 days	Hyp. 0° (Ex. 5°)	(2) 4 days	R. Hyp. 3½° (Ex. 5°)	
L.C.D. A-4282	Hyp. 0° Ex. 2°	R.	(1) 3 days	L. Hyp. ¾° (Ex. 2°)	(1) 6 days	L. Hyp. 1° (Ex. 0)	
J.H.T. A-4738	Ortho.	?R.	(1) 5 days	R. Hyp. ½° (Ex. 8°)	(2) 3 days	R. Hyp. 3° (Ex. 10°)	
S.B. A-8749	Ex. 3°	?L.	(2) 3 days	R. Hyp. 2½° (Ex. 6°)	(1) 6 days	R. Hyp. 5° (Ex. 10°)	
H.E.M. A-8738	Ex. 2° Hyp. 0	R.	(1) 7 days	L. Hyp. 4° (Ex. 12°)	(2) 2 days	L. Hyp. 3° (Ex. 13°)	
E.B. A-8750	Ex. 2° L. Hyp. ½°	R.	(1) 5 days	L. Hyp. 1½° (Ex. 7°)	(2) 3 days	Hyp. 0° (Ex. 6°)	
E.E. A-7697	Orthophoria	R.	(1) 7 days	L. Hyp. 1° (Eso. 2°)	(2) 3 days	Hyp. 0° Eso. 1°	
L.L. A-8780	Ex. 3°—4°	R.	(1) 3 days	L. Hyp. 1°– (Ex. 7°)	(2) 7 days	R. Hyp. 2° (Ex. 10°)	
C.D. A-8779	Orthophoria	R.	(1) 4 days	L. Hyp. 1° (Ex. 1½°)	(2) 7 days	R. Hyp. ½° (Ex. 0°)	
E.C.L. A-8872	Orthophoria	R.	(1) 4 days	L. Hyp. 1° (Ex. 3°)	(2) 7 days	R. Hyp. 1½° (Ex. 4½°)	
M.M. A-8848	L. Hyp.	R.	(1) 7 days	L. Hyp. 1°+ (Ex. 3½°)	(2) 3 days	L. Hyp. ½° (Ex. 5½°)	
G.L. A-8842	Eso. 1° Hyp. 0	R.	(1) 7 days	R. Hyp. ½° Eso. ½°	(2) 7 days	R. Hyp. 2° Eso.0	
D.M.C. 8969	L. Hyp. 2½° Ex. 3½	R.	(2) 4 days	L. Hyp. 3½° (Ex. 5°–)	(1) 6 days	L. Hyp. 2½° (Ex. 6°)	
H.C.M. A-3676	L. Hyp. 2½°	R.	(1) 6 days	L. Hyp. 6½° (Ex. 2½°)	(2) 3 days	L. Hyp. 1° (Ex. 4°)	
E.E.S. A-9018	L. Hyp. 1°	R.	(1) 7 days	L. Hyp. 2°–	(2) 5 days	L. Hyp. 1½°– (Ex. 1°)	
J.T. A-8608	L. Hyp. ½°	R.	(1) 7 days	L. Hyp. 1°– (Ex. 7°)	(2) 4 days	L. Hyp. 1°– (Ex. 8°)	
W.J.M. 9058	L. Hyp. 1° Ex. 5°	ambi L. > R.	(1) 6 days	L. Hyp. 4°	(2) 5 days	L. Hyp. ½°–0°	(3) L. occl. 3 days

Name and case number	Preocclusion Phoria	Master Eye	Left Occluded		Right Occluded		
			Period	Phoria	Period	Phoria	
		R.-eyed				(Ex. 10°)	L. Hyp. 3°–4° (Ex. 6°)
V.T. A-8816	Ortho.	L.	(2) 7 days	R. Hyp. 1½°–0° (Ex. 6°)	(1) 7 days	R. Hyp. 1¼+ (Ex. 0°)	(3) R. occl. R. Hyp. 0°–1½° (Ex. 6°)
J.G.B. A-424	Ortho.	L.	(2) 4 days	R. Hyp. ½° (Ex. 8°)	(1) 6 days	R. Hyp. 1° (Ex. 5½°)	
J.H.H. 4061	L. Hyp. 1°	R.	(1) 4 days	L. Hyp. 6° (Ex. 2°)	(2) 3 days	L. Hyp. 1¾° (Ex. 5°)	(3) L. occl. 1 day L. Hyp. 7° (Ex. 3°)
W.H.B. A-8670	Eso. 1°	R.	(1) 5 days	Ortho.	(2) 5 days	R. Hyp. 1° (Ex. 3°)	
W.D.G. 3230	R. Hyp. 2°	R.	(1) 7 days	Ortho.	(2) 2 days	Ortho.	
F.W. A-8619	R. Hyp. ½°	R.	(1) 8 days	L. Hyp. 1°	(2) 4 days	R. Hyp. 1½°	
P.W.K. A-3509	L. Hyp. 1°	R.	(1) 4 days	L. Hyp. 1¼°	(2) 4 days	L. Hyp. 2° (Ex. 2°)	
E.F. A-8838	L. Hyp. 1°–3° (Ex. 3°)	?L.	(2) 2 days	L. Hyp. 1° (Ex. 12°)	(1) 3 days	R. Hyp. 1° (Ex. 12°)	
F.H. A-9205	R. Hyp. ¾°	R.	(1) 4 days	Ortho.	(2) 7 days	R. Hyp. 2° (Ex. 2°)	
R.N.P. A-8760	Ortho.	R.	(1) 6 days	L. Hyp. 1½° (Ex. 2½°)	(2) 7 days	R. Hyp. 1½° (Ex. 5°)	
R.M.K. A-8949	Ex. 3° R. Hyp. ½°–	L.	(1) 6 days	R. Hyp. ¾° (Ex. 12°)	(2) 8 days	R. Hyp. 2½° (Ex. 14°)	
C.W. A-8896	Eso. 10° R. Hyp. ½°	R.	(1) 7 days	L. Hyp. 1½° (Eso. 6°)	(2) 4 days	R. Hyp. 3° (Eso. 15°)	
A.J.B. A-8112	Ex. 7½° Hyp. 0°	L.	(2) 6 days	L. Hyp. 2° (Ex. 12°)	(1) 6 days	R. Hyp. 3° (Ex. 11°)	
J.A.B. A-8883	L. Hyp. 1°	L.?R.	(2) 5 days	L. Hyp. 2° (Ex. 3°)	(1) 4 days	L. Hyp. 1½°	
J.K.S. A-8918	R Hyp 1° or less	L.	(2) 3 days	R. Hyp. 3°+	(1) 5 days	R. Hyp. 4¾°	
M.S. A-8960	Ex. 3°	R.	(1) 3 days	L. Hyp. 1° (Ex. 10°)	(2) 4 days	R. Hyp. 1° or 0° (Ex. 16°)	
P S.A. 8521	Ex. 2°	L.	(2) 5 days	L. Hyp. 2° (Ex. 6°)	(1) 6 days	R. Hyp. 1° (Ex. 6°)	
F.P.S. A-6776	Ex. 2°	?L.	(2) 3 days	Low L. Hyp. (Ex. 7°)	(1) 7 days	R. Hyp. 1° (Ex. 4°)	
L.M. A-8982	R. Hyp. ¾°	R.	(1) 6 days	R. Hyp. 1° (Ex. 8°)	(2) 4 days	R. Hyp. 1° (Ex. 7°)	
O.B.D. A-8959	L. Hyp. ¾° Ex. 2°	R.	(1) 5 days	L. Hyp. 1° (Ex. 6°)	(2) 3 days	Hyp. 0° (Ex. 6°)	
M.W. 6599 1st test 1927	Ortho.	R.	12 days	R. Hyp. 1°			
M.W. 6599 2nd test 1932	R. Hyp. 1° Low Eso.	R.	(2) 2 days	R. Hyp. 3°–	(1) 6 days	R. Hyp. 3½°	
I.S. A-4891	R. Hyp. ¾°	R.	(1) 7 days	L. Hyp. 1° (Ex. 1°)	(2) 4 days	R. Hyp. 1°–1½° (Ex. 3°)	
E.T. A-9007	Ex. 3°	R.	(1) 6 days	L. Hyp. 3°	(2) 2 days	L. Hyp. 1°	
E.E.P. A-8979	L. Hyp. 1° Eso. 1°–2°	R.	(1) 5 days	R. Hyp. 1° (Ex. 1½°)	(2) 6 days	R. Hyp. 1° (Ex. 2°)	
F.Y. 9631	R. Hyp. ½°	R.	(1) 6 days	L. Hyp. 1°	(2) 3 days	Ortho.	
C.C. A-4058	Ortho.	R.	(1) 6 days	L. Hyp. 2½°	(2) 6 days	L. Hyp. 1°	

Name and case number	Preocclusion Phoria	Master Eye	Left Occluded		Right Occluded		
			Period	Phoria	Period	Phoria	
M.M. A-4862	Ortho.	R.	(1) 7 days	L. Hyp. 3°	(2) 5 days	Ortho.	(3) L. occl. L. Hyp. 1½° Ex. 2°
E.T.C. A-4154	R. Hyp. 1°	R.	(1) 7 days	R. Hyp. 1° Ex. 4°	(2) 7 days	R. Hyp. 6° (Ex. 2°)	
M.T. 6587	Ortho.	R.	(1) 5 days	L. Hyp. 1° Ex. 2°	(2) 3 days	R. Hyp. ¾° (Ex. 5°)	
E.F.H. A-9084	Ortho.	R.	(1) 7 days	R. Hyp. 1° (Ex. 9°)	(2) 7 days	Hyp. 0° (Ex. 12°)	
L.H. A-2310	Ortho.	L.	(1) 7 days	L. Hyp. 3¾° (Eso. 1°)	(1) 11 days	Hyp. 0° Eso. 2°	
T.F.M. 50.43	R. Hyp. 1° Ex. 1°	R.	(1) 6 days	R. Hyp. 2° (Ex. 7°)	(2) 2 days	R. Hyp. 3½° (Ex. 7°)	
C.E. 8447	Eso. 3°	?R.	(1) 7 days	L. Hyp. 1½°	(2) 4 days	R. Hyp. 2½°	(3) L. covered L. Hyp. ¾°
J.C. A-8149	Eso. 2°	?R.	(1) 10 days	L. Hyp. 1½°–2°	(2) 4 days	R. Hyp. 2°	(3) L. covered Hyp. 0°
L.A.S. A-9171	Ortho.	R.	(2) 6 days	L. Hyp. 1½° (Eso. 4°)	(1) 5 days	Hyp. 0° (Eso. 2°)	
S.C.R. A-9149	Ortho.	R.	(1) 5 days	L. Hyp. 8° (Ex. 3°)	(2) 2 days	L. Hyp. 2° (Ex. 3°)	
D.N.N. A-6875	Eso. 5°	?R.	(1) 8 days	L. Hyp. ½° (Eso. 2°)	(2) 5 days	R. Hyp. 2° (Eso. 2°)	
B.L. A-9211	Ortho.	L.	(2) 6 days	L. Hyp. 3° (Ex. 3°)	(1) 6 days	R. Hyp. 1½° (Ex. 2°)	
P.F.B. A-9212	Ortho.	L.	(2) 5 days	L. Hyp. 2°	(1) 3 days	Ortho.	
L.F.I. A-9185	Ortho.	R.	(1) 6 days	L. Hyp. 1½°	(2) 4 days	Hyp. 0° (Ex. 4°)	
G.F.S. A-9178	Ex. 3° R. Hyp. ¾°	R.	(1) 4 days	L. Hyp. 2° (Ex. 9°)	(2) 3 days	L. Hyp. 1° (Ex. 10°)	
B.V. A-9210	R. Hyp. ½°	R.	(1) 7 days	L. Hyp. ½° (Ex. 7°)	(2) 4 days	R. Hyp. ½° (Ex. 8°)	
E.R.C. A-8956	Ortho.	R.	(1) 6 days	Ortho.	(2) 7 days	R. Hyp. 3°	
E.M. A-1442	Ex. 5°	R.	(1) 6 days	L. Hyp. 2½° (Ex. 7°)	(2) 4 days	R. Hyp. ¾°–0° (Ex. 8°)	
L.M.C. A-4333	L. Hyp. 3°	R.	(1) 6 days	Low R. Hyp. (Ex. 2°)	(2) 6 days	R. Hyp. 1°	
E.I.J. A-4594	R. Hyp. ¾° Eso. 1°	?R.	(1) 7 days	L. Hyp. ½° Eso. 2°	(2) 3 days	Hyp. 0 Eso. ½°	(3) left occl. 4 days L. Hyp. 1½° Eso. 0
B.W. A-9128	Ex. 1°	R.	(1) 7 days	L. Hyp. ¾° (Ex. 6°)	(2) 3 days	L. Hyp. ½° Ex. 7°	
W.O.S. A-9226	Ortho.	R.	(1) 6 days	L. Hyp. 1½° (Ex. 10°)	(2) 4 days	R. Hyp. 1° (Ex. 10°)	
R.J.S. A-9233	Ortho.	R.	(1) 6 days	L. Hyp. 1° (Ex. 6°)	(2) 4 days	R. Hyp. 1° (Ex. 4°)	
R.B.J. A-9257	L. Hyp. 1°	R.	(1) 4 days	L. Hyp. 2¼°	(2) 5 days	L. Hyp. 2¼° (Ex. 7°)	
K.D.M 2813	R. Hyp. 1°— Ex. 3°	R.	(1) 4 days	Hyp. 0° (Ex. 2°)	(2) 11 days	R. Hyp. 1½°+ (Ex 7°)	

for sufficient periods as suggested in a paper on the technic of the test in the April 1932 number of the Journal will enable any one to form a reliable opinion of its value.

It is gratifying to find that the test has been found of sufficient interest to stimulate criticism whether pro or con.

1003 State Tower building.

NOTES, CASES AND INSTRUMENTS

TWO IMPROVED INSTRUMENTS FOR USE IN THE O'CONNOR CINCH SHORTENING OPERATION FOR HETEROTROPIA AND HETEROPHORIA

GEORGE N. HOSFORD, M.D.
AND
AVERY M. HICKS, M.D.
SAN FRANCISCO

The lack of enthusiasm with which ophthalmologists have received the O'Connor "cinch shortening" operation for the relief of strabismus, phorias, and other anomalies of the extraocular muscles is probably due to three principal factors: first, the lack of opportunity to see the operation performed and the difficulty of doing an operation from the published account alone; second, the marked inflammatory reaction which has been occasionally noted following its performance; and the third, and perhaps the most important is, that to perform the operation with smoothness and dispatch, special instruments are desirable and have not been available except in a very crude form.

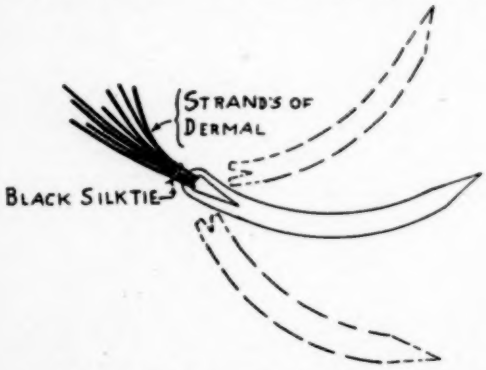

Fig. 1 (Hosford and Hicks). Original needle used for the multiple suture, showing the cumbersome black silk tie and undesirable free motion of the needle in all directions.

The original needles for holding the multiple strands of dermal suture were by no means adequate. The crude method of holding these strands in place in the needle's eye by a loop of silk, made the laying of the sutures cumbersome and difficult. There was always a tendency to abrade and wear out the delicate slips of tendon while drawing through the disproportionately large bundle of suture material. Then, after the laying of the suture had been accomplished, it was difficult and hazardous to exert the amount of pull necessary to transfer the loops from the suture to the slips of tendon.

Two new instruments, a needle and a transfer forceps (an instrument for effecting the transfer of the loops in the multiple suture to the slips of tendon), are herewith submitted. A glance at the diagrams will make clear the advantages of these new instruments. The essential feature of the needle is that the "eye" is covered by a metallic cap of the same outside diameter as the body of the needle. In using it, the cap or collar is removed and the needle is threaded in the usual way. Both ends of the suture are then passed through the cap, which is in turn screwed over the shank of the needle which carries the "eye". This arrangement obviates the necessity of tying the bundle together with silk behind the needle and holds it firmly in place in the direction of the long axis of the needle.

After the loops of dermal have been laid, the strands are placed in the circular notch in the jaw of the transfer forceps. The instrument is then closed and slipped along the strands of dermal until the distal surface of the instrument reaches the edge of the tendon.

The transfer forceps is held in the right hand with the axis of the hole at right angles to the edge of the tendon and parallel to the line of its insertion. The dermal is grasped in the left hand and gently pulled through, directly in line with the axis of the hole in the forceps. An assistant carefully keeps the edges of the incised conjunctiva from being drawn into the loops. It is sometimes necessary, or desirable, after part of the loops have been transferred, to remove the forceps and apply them at the opposite edge of the tendon to effect a transfer of the remaining loops.

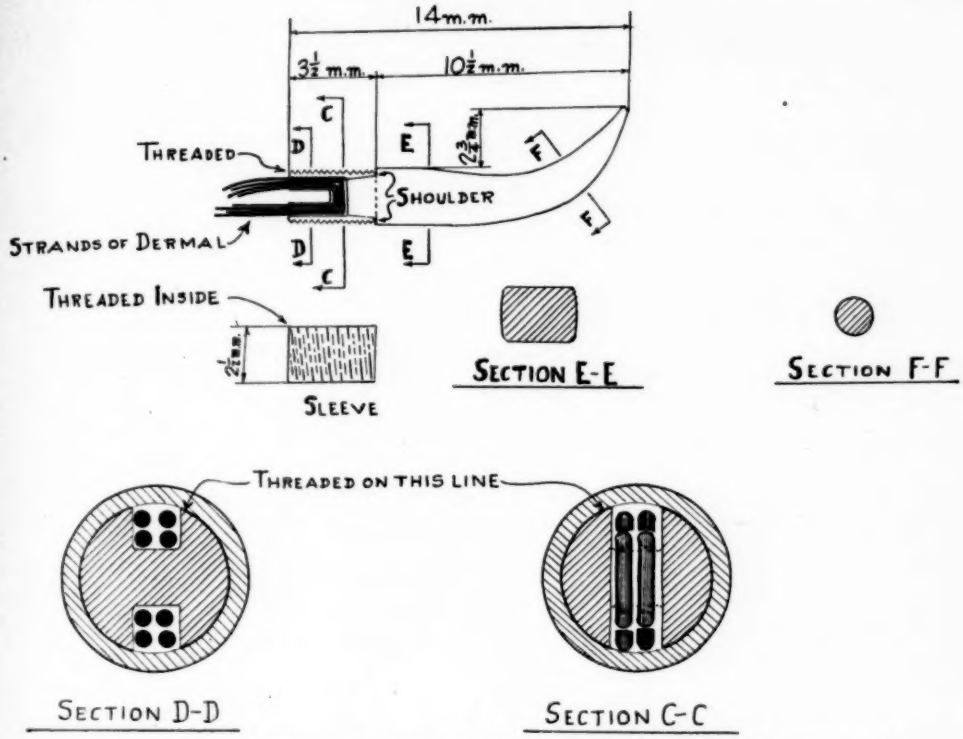

Fig. 2 (Hosford and Hicks). Authors' improved needle with metallic sleeve of same diameter as the needle. This obviates the necessity of tying the dermal together and keeps the bundle of suture material in line with the long axis of the needle.

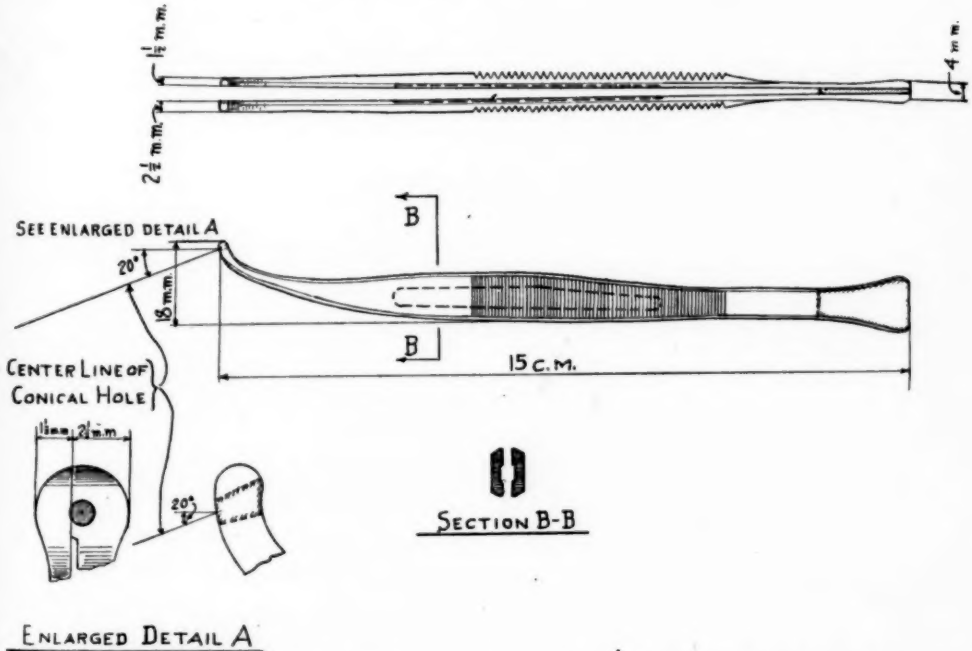

Fig. 3 (Hosford and Hicks). The authors' forceps for transferring the loops of dermal to the tendon slips.

The second objection to the operation which has discouraged some surgeons, namely the amount of inflammatory reaction which occasionally follows its performance, will be dealt with in a later communication.

ENDOPHTHALMITIS PHACOANAPHYLACTICA WITH SECONDARY GLAUCOMA

A Case Report

ROBERT H. COURTNEY, M.D.
RICHMOND, VIRGINIA

In January, 1929, we published, in the American Journal of Ophthalmology, a paper entitled, "The Use of Lens Protein Test before Cataract Operations." In this communication we reviewed the previous work done on lens protein sensitization and reported five cases in which there was positive sensitization. One case was that of a young man who had had a needling operation on one cataract which was followed by a very rapid swelling of the cortex necessitating the removal of a part of it by irrigation a few hours later. Recovery was perfect and he obtained normal sight. Two years later the cataract in the other eye had developed to such a stage that he desired an operation on the second eye. Before proceeding with it, we thought it wise to give the patient a sensitization test with lens protein; we gave him an intradermal test of 1/10 mg. It was followed by extreme swelling and erythema of practically the whole flexor surface of the arm. Within two days he began to show evidence of severe inflammation in the unoperated eye and a secondary glaucoma. An iridectomy was done which, however, did not influence the increased tension, but after treatment with atropine a prompt reduction of the intraocular tension followed. He was started on desensitizing doses of lens protein and later had a negative reaction. It was interesting to note that during this time there was considerable absorption of the lens cortex. The subsequent operation was uneventful.

In September, 1923, before I became associated with him, Dr. Emory Hill performed an extracapsular cataract extraction on Mrs. X. The cataract operation was a perfect success, the vision obtained being 20/15 with correction. The patient was quite happy with the result and seemed to have no particular trouble until some two years later when, due to an alteration in her economic status she found time to develop various eye complaints. She retained normal sight and, aside from various and many complaints of no importance, got along extremely well until March, 1931. While in Florida she developed a very acute pain in the unoperated eye and immediately returned to Richmond. At this time she had an iridocyclitis with a secondary glaucoma. After a few days in the hospital, where she received rather large doses of morphine, there was a fall in the tension to practically normal. The lens-protein test at this time gave a very intense reaction. She was put on atropine and dionin and started with desensitizing doses of lens protein. The inflammation gradually subsided, but a month later she had another flare-up with more evidence of inflammation and an excessive rise of tension. The desensitizing doses of lens protein were continued until she was given a dose as high as 100 mg. At this time the intradermal test was still markedly positive. Between the time she was first seen, in March, 1931, and June, 1931, there was almost complete absorption of the lens cortex, except for the hard nucleus which dropped into the bottom of the capsule. There was, in addition, a quite marked atrophy of the iris. Realizing the impossibility of actually desensitizing this patient while absorption of the lens cortex was continuing, it was decided to remove the lens, in its capsule if possible, in spite of the continued inflammation. Lens and capsule were successfully removed without the loss of any of the cortex. Following the operation there was rather profuse hemorrhage into the anterior chamber with increased tension and considerable pain. Within a few days, however, the blood was completely absorbed. The iridocyclitis promptly

subsided and the eye has continued free from any evidence of inflammation during the past fifteen months. With proper correction the patient has 20/20 vision.

We believe that this case and the one referred to at the first of this report were instances of iridocyclitis resulting from sensitization to lens protein (endophthalmitis phacoanaphylactica). Among other cases of this type of inflammation these were the most dramatic, and it seems important again to call attention to this type. It also seems desirable to call special attention to the absorption of the soft cortex in both cases, this being different in many respects from hypermaturity.

Professional building.

PULSATING EXOPHTHALMOS

S. J. WOLFERMANN, M.D.
AND
M. C. JOHNSON, M.D.
FORT SMITH, ARKANSAS

The literature on this subject is well covered by various writers, namely, Bedell[1], Zentmayer[2], Kirby[3], King[4], and more recently by Wheeler[5]. This case is reported to show the results obtained by using digital compression of the carotid artery, followed by ligation of the carotid artery at a later date. For a time it appeared that a brilliant result had been obtained with the ligation of one common carotid artery, but the apparent cure was of only relatively short duration, six months.

The patient, M. W., a seventeen-year-old white girl, injured in an automobile accident, was brought unconscious into the hospital November 18, 1930. The left ear was torn almost completely loose from the bony parts and lay attached to a flap of scalp back upon the parietal area. There was a large amount of hemorrhage and cerebrospinal fluid coming from the left ear and there was also a tear in the mucous membrane of the vault of the pharynx, which bled profusely. All deep reflexes were temporarily lost, but no abnormal foot signs could be obtained. The diagnosis was basal skull fracture. The patient was put to bed with an ice bag at the head, after a plastic repair had been done on the ear and scalp wound. Spinal fluid pressure did not warrant spinal drainage. She became conscious on the third day, and at her request was discharged from the hospital on the fourteenth day and put at absolute rest at home. When discharged from the hospital all reflex signs, other than the eye signs, were normal. The patient was conscious, though mentally somewhat dull, and it was with difficulty that she was kept at rest. Several days later she noted a blowing sound, synchronous with the heart beat, located above and around the left eye. She also stated that diplopia had been present since the accident.

Examination made at this time showed the following: Right eye, swelling and discoloration of both upper and lower lids; slight proptosis of the globe; pupil dilated and fixed; media and fundus normal; left eye, swelling and discoloration of upper and lower lids; veins of eyelids dilated; moderate proptosis of globe; pupil reacted to light and accommodation; paralysis of sixth nerve; media and fundus normal. With a stethescope a bruit could be heard over the left side of the forehead, temple, and malar bone.

Digital compression of the left common carotid caused the bruit to disappear during the time it was maintained, though symptoms of vertigo appeared in a few minutes. The patient was instructed to use digital compression of the left common carotid artery several times daily, until this produced dizziness or faintness. Her vision one month later was 20/20 O.U. Her condition had not improved when examined several months later and operation was advised. Consent for the operation was refused by the father. However, some months later he changed his mind and the patient was admitted to the hospital, August 21, 1931.

Preparatory to the operation, under the direction of a nurse, the left common carotid artery was compressed three times daily and on the third day the patient was able to hold this com-

pression for fifteen minutes without producing any untoward symptoms. Ligation of the left common carotid under local anesthesia was performed August 25, 1931, using heavy braided silk. The common carotid being exposed for about one inch in length, a heavy braided silk No. 14 was tied around the artery causing practically complete compression, but not tightly enough to produce cutting, and a double square knot was tied in the ligature. After this compression had lasted for a period of three or four minutes, a second ligature of the same silk was tied down upon the artery as tightly as possible, a double square knot being used again. This was placed one-fourth inch distal to the first ligature. It was felt that with the first ligature so compressing the artery as to narrow its lumen, the second ligature could make complete compression without producing cutting. Immediately after ligation the bruit could no longer be heard and the patient was free from all subjective symptoms of head noises. She made an uneventful recovery and was discharged from the hospital October 10, 1931. Paralysis of the left sixth nerve was still present; vision 20/100 O.S. The outlines of the left disc were indistinct and a marked congestion of the retinal veins was present.

The patient left the city and we did not see her again until February 26, 1932, when she returned stating that she had had a return of the symptom of throbbing around the left eye in the past twelve hours. Examination at this time revealed a bilateral convergent strabismus present, a paralysis of the right as well as the left sixth nerve now being present. Visual acuity in the right eye had declined from 20/20 to 20/50-2. Vision in the left eye was still 20/100. The left upper lid was swollen, due to venous congestion and a moderate degree of proptosis of the globe was present. The veins in the bulbar conjunctiva were markedly enlarged and the eyeball red. Tenderness was present on tapping with the finger over the left eye. The bruit synchronous with the heart beat was again present, and pressure on the carotid artery again caused its disappearance. She was advised to enter the hospital for further observation and study. This she did not do and has not returned for further observation.

In summary, the interesting things in this case are, first, that heavy silk cannot be depended upon, as was evidenced in this case by the return of the symptoms and the fact that compression of the same left common carotid artery by digital pressure again stopped the bruit; second, a paralysis of the sixth nerve of the opposite side can occur months after the onset of the symptom of paralysis of the sixth nerve on the injured side.

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[2] Zentmayer, Wm. Traumatic pulsating exophthalmus. Jour. Amer. Med. Assoc. 1916, v. 47, p. 163.
[3] Kirby, D. B., Aneurysm of the intracranial portion of the internal carotid artery. Amer. Jour. Ophth., 1924, v. 7, p. 577.
[4] King, G. L. Pulsating exophthalmos. Amer. Jour. Ophth., 1931. v. 14, pp. 786-791.
[5] Wheeler, J. M. Pulsating exophthalmos due to anterio-venous communication in the cavernous sinus. Proceedings of the International Assembly. 1931, pp. 289-295.

SOCIETY PROCEEDINGS

Edited by Dr. H. Rommel Hildreth

MINNESOTA ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

Section of Ophthalmology

November 18, 1932

Dr. H. J. Rothschild presiding

Monocular glaucoma

Dr. C. N. Spratt (Minneapolis) presented a man seventy-two years old, who complained of loss of vision in the right eye for the past year. The eye had become red and painful in the last two weeks. Tension was 50 mm. in the right eye and 30 mm. in the left (McLean). Examination showed no vision in the right eye, dilated conjunctival vessels on the nasal and inferior portions, and faulty transillumination. The eye was enucleated for sarcoma.

Dr. Spratt also presented a forty-nine year old man who had stated that 18 months previously the vision in the left eye had become blurred, especially toward the nasal side. There was a history of rainbows but no pain or redness. There was no light perception and the tension was 80 mm. (McLean). Vision in the right eye was normal, but there was a slight contraction of the field. Tension was 23 mm. A year ago Dr. Spratt performed a sclerecto-iridodialysis on both eyes. The tension was now 22 mm. in the right eye and 34 mm. in the left eye. The vision in the right eye was 5/4 and the field had improved since operation.

These two patients were of interest because they both had monocular glaucoma; the first being due to a new growth, and in the second to the much earlier development of glaucoma in one eye than in the other.

Cataract and glaucoma operation (pocket flap, sclerecto-irido-dialysis)

Dr. C. N. Spratt (Minneapolis) showed his moving pictures of these operations.

Discussion. Dr. Carl Larsen (St. Paul) said regarding Dr. Spratt's fat implant operation, that he had performed it in between 40 and 50 cases. The results had been very satisfactory except that there was considerable shrinking, in after years. For some time he had been using a bone-ball which was better because there was very little shrinkage. There was, however, more reaction following the bone-ball implant but if inserted properly it remained in situ.

Dr. Spratt (in closing) said that there was an objection to using foreign matter, whether it be glass, gold, paraffin or sponge. There was more danger of irritation and extrusion. Statistics gave about nine or ten percent of extrusion. With the use of paraffin spheres, he had had three extrusions in sixty-six patients. These hard substances tended to wander about the orbit, due to contraction of muscles and formation of scar tissue. The fat formed a soft cushion for the artificial eye and was not displaced. He had had only one patient, in some sixty operations, in which the fat became infected. About one-half the mass was lost. He attempted to put as large a mass of fat in the orbit as possible, about one and one-half inches in diameter, to allow for shrinkage.

W. E. Camp,
Recorder.

BROOKLYN OPHTHALMOLOGICAL SOCIETY

December 15, 1932

Dr. Wm. F. C. Steinbugler, president

Meanderings in ocular pathology

Dr. Jonas Freidenwald (by invitation) reported on the clinical and microscopic examination of the eyes of 1,000 syphilitic rabbits. The lesions found included interstitial keratitis, iritis, papular syphilid of the conjunctiva, gumma of the lid, papillitis, and lesions of the

optic nerve resembling those found in tabes. Cyclitis and choroiditis were conspicuous by their absence. An effort was made to induce the localization of syphilitic lesions in the eye by trauma produced with an electrolytic needle. This effort was only partially successful, but the possible application of such controllable trauma in the treatment of detachment of the retina was discussed. A second effort to induce the localization of syphilitic lesions in the eye through the producing in the eye of an intense monocular infiltration by the injection of Tripan blue and other dyes into the vitreous, was then reported. No syphilitic lesions resulted from these experiments, but the results lead to a general study of the nature of non-specific inflammatory reactions in the eye. In the course of these investigations, phagocytic activity was discovered in a variety of ocular tissues including the ciliary epithelium, the Müller's fibers of the retina, and the glia cells of the optic disc. A comparison of the phagocytosis by Müller's fibers of Tripan blue with the characteristic retinal reaction in retinitis pigmentosa led to the experiment of injecting melanin granules derived from the pigment epithelium into the vitreous of albino rabbits. The similarity of the lesions so produced was compared with that of retinitis pigmentosa.

Vertical deviations

Dr. Daniel Kravitz read a paper on this subject. The author stressed the fact that this condition was assuming a position of ever increasing importance as a causative agent in ocular asthenopias. Many cases were overlooked because routine examination for muscle imbalance was not the rule in practice. The tests for the detection of these errors consisted mainly of the screen and Maddox tests and a combination of both, for near and distance. The author believed that all deviations over 10 prism diopters should receive surgical correction, the choice being between resections and tuckings. In cases in which a horizontal and vertical deviation coexisted, the correction of the vertical error usually gave the best result, often curing the horizontal one.

Toxic amblyopia

Dr. Charles A. Hargitt reported the case of Edw. B., a twenty-eight year old Syrian, who complained of increasing visual difficulty, particularly at the near point, of several weeks' duration. Vision of each eye was 20/200, unimprovable with glasses. Externally the eyes were normal, pupils reacted well, media were clear and eye-grounds negative. Retinoscopy showed a very low degree of myopia. There was an almost complete color scotoma in each eye, confined within the five degree arc on the campimeter below, and just barely extending beyond the fixation point above.

In attempting to determine the etiology various factors presented themselves. The patient had had diabetes for several years and had been taking a fairly large dose of insulin each morning. He was in the habit of drinking two or three cups of coffee each morning, smoked cigars almost continually and drank sparingly of some native alcoholic drink. The history was negative for sinus disease.

It had been brought out that occasionally insulin had been found to be an exciting factor. It was impossible to eliminate the use of it or to even reduce the dose materially for a time, in this instance. Smoking and alcohol were completely discontinued, coffee consumption was reduced, and a formula consisting of quinine sulph., tr. ferri chloride, dilute phosphoric acid and liquor strychnia was prescribed. Four weeks later there was no essential change; at the end of seven weeks the patient was beginning to read with greater facility, and at the end of nine weeks, vision of the right eye had improved to 20/50 and that of the left eye to 20/25. The color scotoma in the right eye had disappeared, a relative one still remained in the left eye. At the end of four months the vision of the right eye was 20/30 and that of the left 20/20, corrected.

The result would strongly indicate that tobacco was the chief cause of the

amblyopia. It was rare however, to find this etiological factor in so young an individual. Sinus disease was probably not the cause. The possibility of the development of multiple sclerosis was to be kept in mind. The question arose as to whether the diabetes or the insulin or both, increased the susceptibility to tobacco.

Melanoma of the choroid

Dr. John H. Bailey reported the case of Mrs. H. A., aged thirty-four years, who complained of a sudden blurring of vision of the right eye. Vision was 20/200 minus; the eye was perfectly quiet; the pupil was somewhat larger than its fellow and reacted sluggishly to direct light; the tension was elevated; the vitreous cavity was filled with blood, obscuring all fundus detail. The left eye was normal. A tuberculin diagnostic test up to 4 mg. O.T. gave no general, local or focal reaction. Since the cause of the hemorrhage could not be determined, the patient was given a course of tuberculin therapy. At the end of five weeks the vitreous hemorrhage had become completely absorbed and vision had returned to 20/30. A detachment of the retina could be seen nasally, extending to the ora serrata. The detachment appeared to be stretched over a mass that was slate-colored, there was no surface pigmentation and transillumination showed no obstruction to light transmission. A choroidal tuberculoma was suspected. Under observation for four and one-half years, the mass did not increase in size, gave rise to no eye discomfort, the vision remained at 20/30 and tonometric readings were within the normal range. During the last two years the surface of the mass had shown some pigmentation and the possibility of malignancy was suggested but the patient would not consent to operative interference. On Sept. 1, 1932, a violent purulent conjunctivitis developed in the affected eye. A smear showed intracellular gram negative diplococci. The cornea perforated and a total loss of vision resulted. Enucleation was performed and a melanotic growth was found. There was no evidence of orbital involvement or of extension of the tumor cells beyond the inner half of the sclera.

George Freiman,
Associate secretary.

ST. LOUIS OPHTHALMIC SOCIETY

October 28, 1932

Dr. Julius H. Gross presiding

Specific protein therapy in ophthalmology—uveal pigment

Dr. Howard C. Knapp read a paper on this subject in which he traced the history of the use of specific protein therapy in ophthalmology, discussed the chemical composition of uveal pigment and described a new method of preparation and standardization.

He reported three cases of sympathetic ophthalmia treated with uveal pigment which showed marked improvement.

Following a discussion of the possibility of allergic manifestations in retinitis pigmentosa, and the present conception of the histopathology of retinitis pigmentosa, the conclusion was reached that no logical basis existed for the treatment of this condition with uveal pigment. Three cases treated without improvement were reported. This paper will be published in the Archives of Ophthalmology.

Discussion. Dr. Meyer Wiener reported three cases of sympathetic ophthalmia treated with pigment prepared by Dr. Knapp.

Case 1. M.M.A., aged four years; right eye perforated by a bird shot, August, 1928. Three months later the right eye showed pericorneal redness and plastic uveitis; the left, mild photophobia with slight redness. Vision with the right eye was light perception; left, 15/20. Enucleation of the right eye was followed in three days by definite evidence of sympathetic ophthalmia in the left. In spite of treatment with protein shock, autohemotherapy, salvarsan and mercury rubs the condition progressed. One year later the cornea was cloudy at the margins, the lens was cataractous, there were complete

synechiae, and evidences of mild inflammation with occasional exacerbations. Uveal pigment therapy was tried without success. After a few injections massive hemorrhages occurred in the anterior chamber. Operative removal of clot was partially successful, but the final result was a completely clouded cornea.

Case 2. L.G., a girl, eight years of age, suffered a penetrating wound of the right eye February, 1928. Ten weeks later the left eye was affected. The right eye was removed, and the usual therapeutic measures employed. November, 1930, the left eye was retracted and soft. There were dots on the margin of the iris which was discolored; light perception and projection were excellent. On December 20, 1930, tests were made with uveal pigment suspension with a negative result. A one-half cubic centimeter dose was given intramuscularly on December 23. One week later a small amount of blood was noted in the anterior chamber. The treatment was continued at intervals of five or six days with doses increased up to 2 cc. over a period of one month. March, 1931, the eye had become less red and no blood was visible; 1 cc. doses of pigment were given at weekly intervals for six weeks. July 1, 1931, tension was low and the eye more shrunken. Another hemorrhage occurred which gradually cleared. The general condition remained the same when last seen September, 1932.

Case 3. C.D., a man aged twenty-seven years, was struck in the right eye by a splinter January 25, 1930. The splinter was removed February 12, 1930, by a doctor in Springfield, Illinois, who stated that the left eye was apparently unaffected until one week afterward. On March 20, vision was reduced to hand motion; moderate redness, little photophobia, tension normal, cornea, aqueous and lens clear; good red reflex but fundus details obscured by posterior vitreous haziness. Foreign protein therapy was instituted and the sinuses were opened because of signs of sympathetic disease. Six weeks later deposits appeared on Descemet's membrane and clumps on the iris margin. Subacute inflammatory signs continued until August 23, 1930, when he was given 1 cc. of uveal pigment and the dose repeated weekly. The eye at once became less sensitive, the deposits decreased, and the vision was slightly improved. Treatment continued at intervals until February 10, 1931, when the eye suddenly became red and painful, but cleared up when larger doses of the pigment were given. Decembr 17, 1931, his eye was red and he reported that it became so every time he started the pigment injections. He had developed a sensitization to it, so its use was discontinued. September, 1932, the eye was quiet, no deposits, lens opaque, light perception good and tension about normal.

Traumatic subluxation of the lens

Dr. Charles W. Tooker gave a short discussion of this subject and reported two cases. He stated that a blow to the eye sometimes caused rupture of the zonula and subluxation of the lens, a matter described in the text books and generally considered as of unfavorable prognosis. He felt the cases reported were of interest because, in one a partial dislocation of the lens had been present for fifteen years without greatly impairing the vision, and the other presented a problem under the Workmen's Compensation laws.

Case 1. W.R., male, aged sixty-two years, seen May, 1932, because of asthenopia, gave a history of striking the left eye against a rail 15 years previously, with subsequent soreness of the eye lasting several days. No oculist had been consulted. When seen in May, 1932, vision of the right eye with +1.75 D.sph. equalled 20/20, and Snellen 5 with presbyopic addition. Vision of the left eye with +0.50 D.sph. was 20/30 and Snellen 1. The left pupil was half dilated and sluggish to light. The left iris was tremulous, down and in. The lens was slightly clouded and the zonular fibers below and nasally were absent resulting in a semilunar clear area in that region where the pupil was well dilated. The intraocular tension was normal.

Apparently the injury to the eye in

1917 (his age then forty-seven years) had caused a rupture of the zonula but apparently no increase of tension had followed, the lens had not become cataractous and had not moved from its fossa.

Case 2. F.D., male, aged thirty-nine years, seen February 26, 1931, because of injury to his right eye five days before, when struck by a large piece of gravel. Vision, right eye, with —5.50 D.sph. was 20/40 and Snellen 1. The left eye was normal. The right pupil was dilated, iris tremulous, zonular fibers absent except in the region "10 to 2 o'clock." The lens was clear, periphery clearly seen below, temporally and nasally. The intraocular tension was right eye, 42 mm. of Hg. (McLean); left eye, 28 mm. of Hg.

In ten days, under miotics, the tension became normal in the right eye and vision with —5.25 D.sph. ⊂⊃ —0.5 D.cyl. ax. 90° equalled 20/25. An attack of congestive glaucoma occurred and was controlled in one week by miotics and hospital care. In October, 1932, tension, visual field and disc were normal; lens cloudy, vision 20/80.

Under the Workmen's Compensation law the insurer, if liable, would pay for loss of the eye whether or not the lens were removed.

Discussion. Dr. J. Ellis Jennings told of a case of dislocated lens in a man sixty years of age, whom he had found to have a mature cataract of the right eye but had not operated because of faulty light projection. Subsequently while playing golf the patient had experienced severe pain in this eye which was found to have the lens dislocated backward. There was posterior synechia, the anterior chamber was funnel shaped, and the tension low. After rest in bed with head lowered for one week the lens had come forward and remained so for several months.

Dr. W. F. Hardy said he had operated on two patients, the cases being widely different in nature. One, a woman thirty-four years of age, had congenital dislocated lenses which had become cataractous, with greatly lowered vision. Extraction, in two stages, had given satisfactory result with vision better than at any time since childhood.

Dr. Hardy's second case was of a man aged forty-one years, who had been struck in the eye by an air hose, suffering partial dislocation of the lens upward. Secondary glaucoma had developed. Iridectomy had controlled the tension for a time but removal of the lens became necessary. He stated the extraction had been difficult because the clear lens could be seen by oblique focal light only. The fenestrated scoop had been better than the spatula ordinarily used and the vitreous loss had been minimal. The eye became quiet but was industrially blind. He said this case illustrated the fact that iridectomy was not an effective measure for the control of glaucoma secondary to lens dislocation.

Dr. Lawrence T. Post said that a posteriorly dislocated lens might not give trouble for a long time and he agreed with the essayist that it was better not to interfere until trouble began. This was usually manifested by secondary glaucoma. He had found ultraviolet light valuable in visualizing the lens floating in the vitreous because of the fluorescence. He said Dr. Hildreth had designed a portable instrument which could be used at operation.

His brother had had a case some years ago in which there was almost complete posterior dislocation. The lens was clear and difficult to see. Secondary glaucoma was beginning and the eye was becoming irritable from iridocyclitis. They had worked half an hour unsuccessfully trying to get a loop behind the lens when the man gave a squeeze and the lens delivered itself with an appalling loss of vitreous. The eye healed surprisingly well and later had 20/24 vision, with correction.

Dr. J. M. Keller said the reports in the literature were discouraging as men who had carefully observed series of cases had not had very good results, operative or other. He thought, with the speaker, that it was wiser to wait longer till the lens could be more easily extracted. He thought the large majority of cases required removal of the lens sooner or later.

B. Y. Alvis,
Editor.

COLORADO OPHTHALMOLOGICAL SOCIETY

November 19, 1932

Dr. J. A. McCaw, presiding

Persistent hyaloid artery

Dr. Wm. M. Bane presented Miss B., a nurse, because of a very large persistent hyaloid artery in the right eye. This eye had vision of about 1/120 and was not much improved with a glass. The vision of the left eye improved to 5/6 with a moderate compound myopic correction.

Discussion. Dr. G. H. Stine believed the appearance of blood in the artery was an apparent darkness from looking at the mass from on end.

Dr. W. C. Finnoff said that strands coming from the nasal side of the disc were usually hyaloid remains while those from the temporal side were never hyaloid remains.

Iris cyst (?) or ointment (?) in anterior chamber

Dr. V. H. Brobeck presented O. N., aged fifty years, who had had a hypermature cataract in the right eye; the left eye was normal. On March 10, 1932, a preliminary iridectomy was done and on March 30, a lens extraction was attempted, but vitreous presented just as the knife made the counter-puncture. The incision was not completed and the operation was discontinued. A second attempt was made in July; much milky cortex presented and was irrigated from the anterior chamber. On attempting to deliver the nucleus it became displaced toward the vitreous; the latter had begun to escape by this time, and the wound was closed quickly with two human-hair sutures. The recovery was slow from this second operation, but the tension remained normal. The lens substance that remained was displaced upward and temporally, the zonule being ruptured nasally.

On September 1, 1932, it was noted that when the patient's head was thrown back, in the office chair, a spherical opaque globule floated down through the mid-pupillary area, and then made a retreat back into the region of the coloboma of the iris. This perfectly round mass seemed to be free in the aqueous. It measured about 2.5 mm. in diameter, and always floated upward. It had not been observed in the lower part of the chamber.

Discussion. Dr. Melville Black advised using a spoon next time to get the nucleus even if considerable vitreous was lost. He believed the mass was composed of iris tissue.

Dr. C. E. Sidwell said that he believed the floating object was ointment that had gotten in at the time of the operation. He urged its removal, because, in his opinion, it was a potential cause of glaucoma.

Dr. W. C. Finnoff said he believed it unsafe even to put vaseline in the conjunctival sac after an operation. He recalled having seen two cases of vaseline in the anterior chamber, one after merely a paracentesis. Dr. Finnoff said that the mass in this case did not appear the same and believed it was an iris cyst.

Dr. E. R. Neeper said he noticed that one side of the globule always stayed up; if it was composed of ointment it would rotate.

Brain tumor (improvement after taking encephalogram)

Dr. W. C. Finnoff and Dr. E. Raynolds presented Mrs. H. F. R., aged fifty-five years, a seamstress, who had been first seen January 11, 1924, complaining of blurred vision for near. With the exception of several small floaters in each vitreous the fundi were normal; vision was 1.2.

She was not seen again until August 30, 1932, when the vision O.D. was 0.5 with + 1.25 D. sph. and O.S. was 0.3 with + 0.75 D. sph. The floaters in the vitreous of each eye had increased slightly in number. Both discs were elevated three diopters, the edges were blurred, and the veins tortuous. Visual fields showed slight concentric contraction and a definite lower right quadrantic homonymous hemianopsia in addition to enlargement of the left blind spot.

There was a history of severe intermittent headaches for the past 26 years, which were not so severe recently. There was marked mental confusion. Encephalograms were taken by Dr.

George Johnson (90 cc. of air injected). A small left lateral ventricle with displacement, probably due to neoplasm of cortex of left hemisphere, was found. When next seen October 18, 1932, she felt much better and vision with correction was O.D. 1.2; O.S. 1.0. Her mental confusion had disappeared. The fields showed slight improvement; fundi were unchanged, still showing choking of the discs.

On November 17, 1932, she claimed to feel well. Vision with correction was O.D. 1.2; O.S. 0.3. The fundi were unchanged; both fields had improved, but still showed the greatest constriction in the lower right quadrants.

Dr. Finnoff showed the encephalograms and a series of visual field records. The case was presented because of the quite unexpected improvement resulting after the taking of a diagnostic encephalogram.

Discussion. Dr. F. R. Spencer suggested that the improvement after the encephalogram, might result from breaking up of adhesions.

Dr. Maurice Marcove mentioned that he had found bilateral choked discs recently during the course of a refraction, and at operation an asterocytoma of the third ventricle was found.

Perforating injury of sclera, and subhyaloid hemorrhage

Dr. Wm. C. Finnoff presented Mr. J. H. C., aged fifty years, a laborer, who while cutting barbed wire, November 9, 1932, had been injured by a piece flying upward with considerable force and penetrating the sclera, choroid and retina of the right eye in the horizontal meridian about 5 mm. to the nasal side of the limbus. The wire had been re- and at operation an asterocytoma of cently during the course of a refraction, moved by a fellow workman and the eye treated by the local physician for three days. The physician thought that the wound was closed.

He was first seen November 12, 1932, when he complained of blurred vision in the right eye and of slight pain. This was accompanied by circumcorneal injection. Vision right eye was 0.2 and left was 1.2. The aqueous was slightly turbid, vitreous hazy and disc slightly hyperemic in the right eye. A horizontal perforation in the sclera about 3 mm. long with a tag of vitreous protruding through the conjunctival wound was present. The tip of protruding vitreous was snipped off and the hole in the sclera cauterized with the actual cautery. A conjunctival flap was sutured over the wound. Atropine was instilled. Antitetanus serum was given for specific and foreign protein effect.

The progress was uneventful, vision improving each day. A globular subhyaloid hemorrhage was easily seen on the nasal side in the horizontal meridian. The retina was in position.

Unilateral exophthalmos, post traumatic

Drs. W. C. Finnoff and E. Reynolds presented Mr. L. A. E., aged twenty-two years, a stenographer, who was first seen March 25, 1932, complaining of blurred vision, inflammation of right eye, stabbing pain in right frontal region, dizziness, and attacks of fainting. Duration of symptoms was about three weeks. He had had an auto accident eight months previously in which both jaws and the zygoma had been fractured on the right side. Union had been delayed for several months.

The vision was, right eye, 0.6; left eye, 1.0. There was marked engorgement of conjunctival and anterior ciliary veins, and a slight subconjunctival hemorrhage on right side. Fundi and fields were normal.

The symptoms then subsided until May, 1932, when the right eye became very red, tender, and painful; dizziness and acute pain over the right eye recurred. Pain radiated to right temple and behind the right ear. There was marked engorgement of episcleral and retinal veins. Vision right eye was 0.2; left eye, 1.0. There was marked proptosis. On May 11, the patient had chills and a temperature of 102°. Fields showed some contraction. X-ray showed no evidence of orbital fracture and no sign of bone disease or bone tumor in this region. The ethmoid sinuses were negative. The temperature continued at 102° to 103°. On May 16, the orbit was incised at the outer margin;

no pus was obtained, but improvement followed. On June 10, the vision of the right eye was 1.0; exophthalmometer measurement of the right eye was 22 mm.; left eye 15 mm. The condition remained unchanged until September 28, when acute pain returned in the right side of the head. This subsided in two days, but recurred November 10. At the present time there was marked congestion of the conjunctival veins and veins in the lower cul-de-sac. The retinal veins were tortuous and disc red. Measurement with Hertel's exophthalmometer read 23 mm. on the right and 19 mm. on the left. There was no limitation of ocular movements and no bruit or pulsation of the right eyeball.

Discussion. Dr. C. E. Walker thought that dionin locally might help.

Dr. Wm. C. Bane advised some form of local blood depletion.

Dr. E. R. Neeper recommended the use of high frequency electricity for ten minutes two or three times a week.

Stephenson's congenital pigmentation of the retina

Dr. R. W. Danielson presented a case in a twenty-three-year-old man. The eye had given no symptoms, had normal vision, and otherwise seemed normal. This condition was sometimes known as pigmented nevi of the retina. It had also been called "rabbit-track retinitis", because of the peculiar grouping of the smoothly oval or round, brownish black pigment deposits. In this case one large aggregation of these deposits gave the appearance of a bear track. Most of the isolated or grouped spots were in the lower nasal quadrant. The other eye showed none of the abnormality.

Hysterical? or snuff? amblyopia

Dr. R. W. Danielson presented Mrs. G. S., a forty-year-old widow, who was first seen two months previously because of acute catarrhal conjunctivitis which readily cleared. She gave a history of poor vision of a year's duration; no other eye complaints. She claimed she had fainting spells. She admitted having used snuff rather copiously and constantly for 15 years.

She also claimed to have had angina pectoris for many years, for which she had taken considerable nitroglycerine. She said she had had ulcers of the stomach with hemorrhage a few years previously. She had had nine pregnancies with six miscarriages. About a year previously she had been to the Colorado General Hospital with acute salpingitis, pyorrhea alveolaris, and a questionable angina pectoris. While at the hospital her blood, spinal fluid, and urine were normal, including Wassermann tests.

On examination one could find no abnormality of the exterior of the eye, the pupillary reactions were normal, and the media and fundi were normal. The vision with a moderate compound hyperopic correction was 4/12 and J 6 O.D.; 4/10 and J 5 O.S. Visual fields showed marked concentric contraction for forms and colors to just within the blind spot. An electrocardiogram gave no evidence of angina pectoris. Inasmuch as some cases of so-called tobacco poisoning had been found due to the presence of lead, a specimen of the snuff was analyzed. It was found to contain copper, iron, magnesium, aluminum, and chromium, but no lead, mercury, silver, or arsenic.

Discussion. Dr. Melville Black believed the case was one of hysteria. He said he had never seen a case of snuff amblyopia; all the cases of tobacco amblyopia that he had ever seen had been in those who were using both alcohol and tobacco.

Dr. E. R. Neeper said he wondered whether mouth sepsis might not be a factor, for he noticed she had a very foul breath.

Dr. G. H. Stine asked whether she had been tested for tubular vision (this was done a few days later and found to be very suggestive). Dr. Stine also mentioned that if the poor vision came from the gastric hemorrhage that one would expect optic atrophy with it. He also wondered whether the nitrites that had been taken might be a factor.

Dr. J. A. McCaw said the case to him seemed to be one of retrobulbar neuritis.

R. W. Danielson,
Secretary.

CHICAGO OPHTHALMOLOGICAL SOCIETY

November 21, 1932

DR. MICHAEL GOLDENBURG, president

Retinal hemorrhage

Dr. Virgil Wescott presented a forty-seven-year-old man, who had an old iritis and retinitis in the right eye. There was an acute iritis in the left eye with a secondary rise in tension to 35 mm. Hg. Vision in O.D. was 20/60; O.S. 20/200. Blood pressure was 140/60; albumin four plus and no glycosuria. A year ago he had had a severe cellulitis of the lower extremities at which time he was given insulin because of an uncontrolled diabetes. Ten days ago a large preretinal hemorrhage occurred, involving the entire nasal half of the left retina.

Superficial punctate keratitis with iridocyclitis

Dr. M. L. Folk said that the interesting feature in this case was the combination of the two conditions. The patient was first seen a few weeks ago. There was edema of the corneal epithelium and deep lesions in the cornea, precipitates on the posterior surface and cells in the anterior chamber. The Wassermann was four plus. The connection between the superficial punctate keratitis and the iridocyclitis was not clear but the latter was probably due to lues. Elevations on the cornea were shown clearly by the slitlamp. Both Dr. von der Heydt and Dr. Gradle agreed to the diagnosis of superficial punctate keratitis. The keratitis had improved somewhat under antiluetic treatment, but there were still some spots visible.

Discussion. Dr. Meyer Wiener said that he had a patient under observation in whom this condition had been present for four or five years. It had been observed three or four months. On complete physical examination she reacted positively to the Schilling test for tuberculosis, which was surprising as she looked perfectly healthy. Under tuberculin treatment the condition improved greatly.

Cystic tumor of the lower lid

Dr. Thomas D. Allen said that the patient, aged seventy-eight years, was first seen in August, 1929. At that time he had a small cyst in the right lower lid. Vision with glasses was O.D. 20/200; O.S. 1/200. There was a large posterior staphyloma which involved the entire macular region of the left eye and another that extended just below the macula of the right eye, possibly involving a portion of the macula. The cyst was removed a few days later, but the specimen was lost.

One year later he was again seen with a lesion the size of a split pea, extending along the border of the right lower lid near the outer canthus. It was dark in color, but there was no induration in the surrounding tissues. The patient was referred to Dr. William L. Brown for radium application. After a few treatments the patient disappeared and was located only today. Vision in the right eye was now 16/200. The region of the tumor was covered with a very thin scar in which a few blood vessels were seen. These were more marked on the conjunctival surface and appeared like a small naevus, about 4 x 4 mm. in size. The edge of the lid with its lashes and tarsus was in part absent. There was a very faint opacity of the lens, such as was described at the first visit three years ago.

Tumors of the eyeball and adnexa

Dr. Georgiana Theobald reviewed this subject and demonstrated on the screen specimens received in the laboratory at the Illinois Eye and Ear Infirmary. During a twenty-five year period at this Infirmary, 295 tumors of the eyeball and adnexa were removed while 270,790 patients presented themselves for treatment.

One hundred and thirty-three tumors were malignant, 162 benign. Lid tumors totaled 174; 40 of which were malignant epithelial growths. Orbital tumors numbered 40; 14 of which were malignant; namely six sarcomata and eight of epithelial origin. There were 23 epibulbar tumors, 12 of which were malignant; namely, three sarcomata and nine epitheliomata. Bulbar tumors numbered 58; 32 sarcomata of the uveal tract and 26 retinal tumors.

Dr. Theobald stated that sarcoma of

the choroid should be suspected and the eyeball be removed where there was a unilateral rise in tension in a blind eye.

Discussion. Dr. R. H. Jaffe said the term melanosarcoma should be avoided in discussing the melanotic type of intraocular tumors. The ability to produce melanin was restricted to the ectodermic cells. Thus the tumors were really carcinomas and the fact that the tumor cells often assumed spindle shape was of minor importance. Melanin was formed by the cells from a leuko-base circulating in the blood with the aid of an oxydizing ferment, the dopa-oxydase. Bloch had demonstrated this dopa-oxydase only in ectodermic cells and in leukocytes. Recent studies of Masson had shown the intimate relationship of the melanotic tumors to nerve fibers.

One of the most important features of melanotic tumors was the great tendency to produce metastases. Not a single organ escaped the mestastatic involvement. He had seen cases in which every organ from the hypophysis to the uterus or epididymis was studded by tumor nodules. The average length of life after the diagnosis of melanoblastoma had been established was eight months. The longest duration he had seen was three years.

In considering retrobulbar tumors, one must keep in mind Schüller-Christian disease, which was a disturbance of the lipoid metabolism; different fatty substances, cholesterol and cholesterol esters especially, were deposited in various organs, which caused the formation of characteristic granulomata. These granulomata often affected the bones, and when the bones of the skull were involved, the tumor-like, bright yellow masses frequently extended into the orbital cavities, causing a unilateral or bilateral exophthalmos. The lipoid granulomata responded well to x-ray treatment.

Dr. William H. Wilder said that the prognosis depended upon the chronicity of the tumor. It had been customary to divide the course of intraocular growths into four stages, although the lines of demarcation of these stages might vary considerably: First, the stage of quiet progression in which the tumor grew slowly from one of the inner coats but did not cause irritation; second, the stage in which the growth had progressed to the point of causing at times symptoms of irritation, ciliary injection, floating opacities, impairment of central and lateral vision, increase of tension; third, the stage in which the growth had perforated the eyeball, invading the orbit or surrounding parts; and fourth, the stage of metastasis to different parts of the body.

In Vienna, he had observed as a student an unusual case illustrating the uncertainty of prognosis. The subject under examination, a man over sixty years of age, showed metastases of melanotic sarcoma in almost every organ of the body, including bone marrow. This man had had one eye removed thirty years before which showed well marked melanotic sarcoma of the choroid. The tumor probably had been removed during the stage of quiet because the growths were not large. Thirty years was a very long time following excision of the eyeball to have metastasis occur, but the instructor, one of the eminent pathologists of the day, maintained that the lesion in the eye was probably the cause of the extensive metastases in various parts of the body. These lesions, however, might have been independent of the neoplasm in the eye, being an entirely new process.

Dr. Georgiana Theobald said in answer to Dr. Folk that in so-called leukosarcoma of the choroid, pigment might be found in some of the cells.

Radium therapy in ocular diseases

Dr. Wm. L. Brown said that when using radium in treating lesions involving the structures of the eye, the softer beta rays were employed for the more superficial lesions and the penetrating gamma rays for the deep-seated tumors.

Generally speaking, the eye tissues were quite resistant to the action of radium rays when properly used. However, one should exert every precaution in the selection of ray used, special screening and delivery of dosage. Heavy dosage delivered over a short time was less likely to cause damage

than the same dose spread out over a long period of time.

The injuries most likely to follow radium treatments were cataract, optic atrophy and retinitis. Minor damage to the eyelids and conjunctiva was seen more often, but usually diminished or disappeared later.

This study covered a series of 258 eye lesions treated with radium. Thirty-five different diseases were treated. Generally speaking, good results followed the treatment of epithelioma, vernal catarrh, blepharitis, trachoma, papilloma, hemangioma, conjunctivitis, and melanotic epibulbar tumors. Intrabulbar and retrobulbar tumors were perhaps best treated by surgery and radium therapy combined. Excellent results followed the use of radium alone in 30 cases of melanotic epibulbar tumors. One such patient died following repeated resections and later radium therapy. Unfortunate experiences suggested that the removal of a biopsy specimen was a dangerous procedure.

Conclusions from this study were as follows. 1. Radium therapy had a definite field of usefulness in the treatment of certain ocular diseases. 2. Unpleasant complications might result if the radium was improperly applied. 3. The cosmetic and functional results following its proper application were often most gratifying. 4. It was distinctly of advantage when used along with surgery in treating deep-seated malignant tumors. 5. Its usefulness had been well demonstrated in treating certain superficial conditions, especially, melanotic epibulbar tumors, epitheliomata, hemangiomata, vernal catarrh, and trachoma.

Discussion. Dr. Arthur W. Stillians said it seemed that in the use of radium, as in x-ray, deep therapy had often been used where it was not necessary and was even harmful. Much better results were obtained in superficial lesions and much less damage done to the tissues, especially blood vessels or connective tissue, if softer rays were used for a short time. This was true in hemangioma, if treated in infancy.

He could not match Dr. Wilder's story of metastasis thirty years afterward. One case was seen at the County Hospital in which the scar from removal of a melanoma in the back was several inches in diameter, where metastasis took place about ten years afterward. The patient died two years later. There were metastases all over the body, the heart was practically two-thirds melanoma.

Dr. Robert von der Heydt mentioned a case in a woman forty-two years old seen seven weeks ago with a melanoma of the iris which had been present since childhood. She lost the vision of the eye quite recently. With the slitlamp about twenty or more little vessels that seemed to loop forward were seen and in certain surface areas there was pigment. The tension was 10 mm. on the first day the eye was seen. Eight days later an attack of acute glaucoma ensued which did not subside until the eye was enucleated. The tumor filled about seven-eighths of the eyeball, lying behind the lens. The macroscopic diagnosis was sarcoma of the ciliary body and choroid originating apparently from the melanotic spot seen on the iris, at about "7 o'clock."

Dr. William H. Wilder mentioned that some of the cases described in Dr. Brown's paper had been under his observation. One of the most striking had been exhibited at different times to the Society; a woman of about forty years of age who presented an epibulbar growth in one eye which, from its heavily pigmented character, was regarded as melanotic sarcoma. Most men who saw the case, including Professor Fuchs and Dr. de Schweinitz, agreed that enucleation and subsequent treatment with x-ray or radium should be done. The patient very positively declined enucleation as there was no sign of any growth in the interior of the eye and vision was perfectly normal. Radium treatment was resorted to with most gratifying results. Every vestige of the tumor disappeared; even the quantity of pigment scattered beneath the conjunctiva was removed. Within the last month, twelve years after the disease was active, the eye appeared perfectly normal with normal vision. There was no trace of the growth or of pigment

over the site of the tumor or in the surrounding conjunctiva.

Dr. Harry Woodruff said that cataract occurred not infrequently from the use of x-ray about the face where the eyes were not sufficiently protected. The same thing might happen in treatment of tumor of the cornea or conjunctiva with radium. It was presumably impossible to protect the deeper structures of the eye from such exposure.

Dr. R. H. Jaffe asked Dr. Brown whether, in the cases of melanotic tumor of the sclera which responded so promptly to radium treatment, the diagnosis was verified by microscopic examination. This was of fundamental importance, since not every pigmented lesion of the eye was a melanoblastoma. Granulomas might become pigmented by phagocytosis of the preexistent normal pigment through the phagocytic elements of the inflammatory tissue. If the tumors of the eye were really melanoblastomas he was surprised at the excellent response to irradiation, as in his experience melanotic tumors usually were quite radium or x-ray resistant. One factor which had often been neglected in the treatment of malignant tumors was the importance of the normal mesenchymatous defense reaction of the body against the tumor cells. The stimulation of this defense reaction was at least as important as the destruction of the tumor cells by the radiation.

Dr. Meyer Wiener said that about two or three years ago Hillgartner of Texas reported before the American Medical Association the use of radium immediately following resection of corneal scars, and it was felt that there was less vascularization after irradiation than when the resection had been done without the use of radium, on the principle that new blood vessels and new cells were less resistent to radium than the old ones. In a case of dense corneal opacity, on which Dr. Wiener operated some time ago, he removed the corneal scar with a fairly good result. Recently, since this article appeared, he operated on the other eye and used radium immediately following the operation, with better result. He had operated on two cases since, and his impression was that radium had done a great deal of good.

Dr. William L. Brown (closing) said that he had had no personal experience in applying radium immediately following the resection of corneal scars. Radium had been used, however, in a great number of keloidal scars where a well-defined keloid was developing; this being done with the idea of absorbing the excess fibrous tissue, leaving a loose, soft scar, eliminating the keloid characteristics.

Dr. Brown did not wish to appear too optimistic about cataracts developing after radium treatments. This report covered only his own series, where one cataract developed and he had no knowledge that the lens in any other case in the series had shown cloudiness following radium therapy. Other workers had reported cataracts, and it was entirely possible that more cases might develop cataracts in this series.

The lens was probably more sensitive to x-ray than to radium. Deep x-ray therapy seemed to produce some systemic reaction, also local reaction of the irradiated tissue, which apparently did not occur with gamma irradiation. The average x-ray treatment over a breast frequently produced extreme irradiation sickness. The gamma ray when used in large amounts did not. Extensive telangiectasis was seen following x-ray treatment, but not following the use of the gamma ray. It could only be assumed that there was a somewhat similar reaction in the eye tissue following x-ray therapy which differed from the following gamma or radium radiation.

Histologic examinations were made on only two cases of retrobulbar tumors and one papilloma involving the conjunctiva. It was the intention to represent these melanotic tumors only as pigmented or melanotic tumors, not as malignancies. Many were referred with a clinical diagnosis of melanosarcoma. No effort was made to diagnose the degree of malignancy, but certainly some tumors had all the characteristics that would lead one to consider them malignant.

Robert von der Heydt

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THE CONTAGIOUSNESS OF TRACHOMA

Although still contested by some writers of repute, the direct transmissibility of trachoma is now rather generally accepted, especially by those laboratory workers who have devoted a great deal of time and effort to studying the part played by Noguchi's Bacterium granulosis.

The late Harold Gifford was convinced beyond question that he had personally contracted typical trachoma from secretions which had been projected from the eye of a patient into his own eye. Numerous other incidents of the same kind have been reported from time to time.

During the past four years, Cuénod and Nataf, workers in the trachoma problem at the Pasteur Institute of Tunis, have seen three clearly established cases of direct transmission in oculist colleagues with whom they were well acquainted. (Archives d'Ophtalmologie, volume 50, page 261). In each instance the trachomatous infection was contracted on a definite date as the result of accidental projection of discharge from the eye of a patient who was being operated upon for cure of this disease; and each of the three physicians had previously been entirely free from ocular disturbance.

In two out of the three cases, only one eye received the discharge from the eye which was being operated upon, and in each of these two cases only the one eye of the surgeon was attacked by trachoma. In the third case both eyes received the discharge and both eyes developed the disease. The period of incubation was from three to six days. One of the monocular cases developed severe pannus, with corneal ulcerations; the other monocular case, of more recent onset, showed early corneal changes; the bilateral case, dating from the autumn of 1931, had passed through a stage of swelling of the corneal epithelium, with decided reduction of visual acuity, but was showing improvement.

The question arises why, in a country so infested with trachoma, such cases are not matters of daily experience. But infection with trachoma apparently presupposes the simultaneous occurrence

of a number of favorable conditions. Several years ago Cuénod and Nataf (Archives d'Ophtalmologie, volume 47, page 45) discussed the possible dependence of trachoma upon an ultravirus acting in conjunction with several bacteria whose function is mainly as carriers of such a virus.

A phenomenon well recognized in physics and in the physiology of plant life is that known as adsorption, or the concentration of gaseous or dissolved substances at the surfaces of solid bodies. The same principle as applied to the association of viruses with living cells or bacteria has lately been discussed under the name of biotropism (Hauduroy) or microbiotropism (Schousboë).

Cuénod and Nataf again argue that "the optimum conditions of development of the trachoma virus" may coincide, at least in certain cases, "with the optimum conditions of multiplication of the germs which provoke conjunctivitis," a presumption "which would explain particularly the frequent and almost symbiotic coexistence of trachoma with very diverse forms of conjunctivitis." They continue: "Bacterium granulosis, if not itself a carrier germ, might be what has been called a 'microbe de sortie,' that is to say one of those polymorphous bacteria a part of whose life cycle is passed in the ultramicroscopic and filtering state. In this form it is not impossible that it may be conveyed in a state of adsorption by various common bacteria."

All this, our authors confess, is merely hypothesis. But they are no longer willing to admit that the contagiousness of trachoma is open to doubt.

W. H. Crisp.

CAUSES OF BLINDNESS

Modern, preventive medicine rests on a knowledge of the causes of disease. Yet in America there is no good list of the causes of blindness. Except possibly in Great Britain or Scandinavia, there seems to be no such list in the world. The National Society for the Prevention of Blindness has wisely undertaken to form a list of the causes of blindness. Such a list will serve as a basis for the classification of cases; and to suggest lines of action, for those who are interested in the scientific and humanitarian aspects of blindness.

The start has been made with the list of diseases prepared by the National Conference on Nomenclature of Disease. But that list furnishes a poor model for a list of causes of blindness. It has a double plan of classification, making essentially two different lists. This duplication is confusing, and not helpful in a list of the causes of blindness. The list of diseases classifies them according to the part affected—a topographical list; and also according to the cause of disease—an etiologic list. Only the latter is suggestive for a list of causes of blindness.

The causes of blindness must operate through one small organ, the eye, and the neural prolongations of the retina into the brain. They may affect other parts of the body, but the changes produced in other parts never cause blindness. Such changes may be important and interesting from the point of view of pathology, or of therapeutics, or biology, and all branches of science are related. But a classification for general scientific purposes must be too extended and cumbersome, to be serviceable to those interested primarily in the prevention of blindness.

It is right to recognize the conjunctiva and cornea as separate structures, and disease may affect one and not the other. But when ophthalmia neonatorum, or trachoma, causes blindness, both conjunctiva and cornea are affected. The eye is a single organ. To classify diseases by the particular part of the organ first, or chiefly affected, as which valve of the heart, or lobe of the liver, is a differentiation that would quickly run into absurdity.

Blindness is not mere impairment of vision. When called blindness it is permanent, and complete for some special purpose, even if it does not amount to complete absence of light perception. Before blindness a great part, or the whole visual organ is involved. There is no advantage for a list of causes of

blindness to have refinements, that are appropriate to the classifications of disease, or pathology.

A list of the causes of blindness should be simple, and easy to understand. It is not to be used only by ophthalmologists. It should be fully understood by the whole medical profession. The causes of blindness often operate as general diseases; or causes of impaired health and nutrition, for years before blindness is feared. The chances that they may produce blindness must be understood by the general medical profession to prevent such a result. Those who nurse patients must understand the danger of blindness and the importance of its prevention. In some parts of the world, smallpox is still a most important cause of blindness. Only general vaccination can prevent such blindness. Those who deal with industrial injuries must have some understanding of the possible and probable causes of blindness. Simplicity in the list of causes of blindness is important if it is to meet all the different needs such a list should meet. That is why it is important to have such a list.

Edward Jackson.

ORTHOPTIC TRAINING IN THE AMBLYOPIC PATIENT

With the many advances that have been made in ophthalmology during the past two decades one important condition has been generally neglected. It is that of the development of binocular single vision in those in whom it had been lost or had never existed.

The treatment of strabismus has largely been based upon correcting the anomalies of refraction and in improving the operative technic on the muscles. In a large proportion of cases, however, after this has been done there still remains the inability to use the eyes stereoscopically as the cortical areas of the corresponding retinal points are not able to form a single image. The disadvantages of this condition are very evident. While the eyes may not be apparently crossed there is a lack of fixity of the gaze which is noticeable to the observer and annoying to the subject. It tends to confuse the mentality and the effort to see is so disturbing that greater comfort is often secured by still further suppressing the image of the defective side and the eye again drifts out of alignment.

The difficulties of reeducating such amblyopic eyes in a busy office are almost insurmountable. A special technic must be acquired in order that the appliances necessary may be satisfactorily used. Three other requisites in the management of this condition are tact, patience and time. The child must not be wearied or his cooperation will be lost. His interest must be maintained and he must see that he is making progress. Such training becomes an educational matter quite as much as a medical problem. It is a physiological restoration of a lost function. It is not accomplished in one or two or three sittings. René who strove so long to awaken his French colleagues to a recognition of the importance of this work would give several years to the necessary training of a child with this visual defect. Newer methods have shortened the time materially and now Cantonnet asserts that in 70 percent of the squinting children fixation may be secured and the eyes made to work harmoniously together without operative intervention.

To accomplish this result special arrangements must be made. This has been attempted in two ways. Special clinics have been established in London for the training of these amblyopic children, and with marked success. In New York State four demonstration classes in orthoptic training were formed in Westchester County public schools under the authority of the New York State Commission for the Blind. A woman trained in the management of these cases was placed in charge. From the towns of White Plains, Tarrytown, Peekskill and Mount Vernon, fifty-three children were registered. Some were newly admitted or were lax in attendance and for statistical purposes were omitted. Of the forty-three remaining twenty-six or 50.45 percent had convergent strabismus, and 37.20 percent had amblyopia exanopsia. Almost

all other muscular anomalies were represented.

Of eighteen children listed as amblyopic ten or 55 percent showed measurable diminution of the amblyopia and of forty-three only four showed no improvement in the function of fusion after four weeks of training.

The interest in the class was manifested by the doctors by whom the cases were referred and by the parents who gave helpful assistance at home. Such classes or clinics would be of great help to eye-physicians if they could be formed and made available for amblyopic patients in other populous centers throughout the country.

Park Lewis.

THE SIXTY-NINTH ANNUAL MEETING OF THE AMERICAN OPHTHALMOLOGICAL SOCIETY

The 1933 meeting was held in Washington, May 8, 9 and 10 as part of the program of the Congress of American Physicians and Surgeons.

From every point of view this was one of the best meetings of the Society in recent years. The papers were of high calibre and the attendance was unusually large. It is interesting to note the improvement in the scientific contributions that has taken place, due probably in part to better facilities for study in laboratories, offices and clinics, more special tests that help reveal the etiology, more variety of treatment, and superior instruments for exact examinations. The photography has improved and the projection of slides and illustrations is vastly better. Realizing the importance of the best possible representations of sections, there are some contributors who bring their own technicians and special instruments. It is a delight to see the ease and dexterity with which projections are made; the rapid changes from low to high power or vice versa; the precise adjustment of focus. When one recalls the customary delays and uncertainties and possibly his own past difficulties in this respect, he cannot but be exceedingly grateful to the demonstrators for the time saved, and he may be more than a bit envious.

Whether there is any feature of the Congress as such, sufficiently unique to justify the continuation of that organization, appears doubtful. The members from each society attend rather strictly to their own specialties and are seldom seen as visitors to other sections. The American Medical Association serves better the purpose of a foregathering of the various groups because of its greater democracy. However, the Congress itself does not interfere with the activities of its official branches; Washington is a delightful city and its physicians are charming hosts. The obvious objection to the organization is that it serves no distinctive function and surely medicine has more than enough societies.

There are published each year in the Journal a considerable number of the papers read before the American Ophthalmological Society because it is realized that the Transactions of this Society are not seen by many of the profession and the majority of the papers are so excellent that they should be made readily available to all.

To attempt a review of these presentations here is not possible but one group of essays dealing with the composition of the aqueous humor may be referred to for the purpose of stressing a certain point. Three splendid papers were read on this subject, each based on studies by different methods. The findings were perhaps of somewhat academic nature but were fundamental in the study of ocular physiology.

It is heartening that there are brilliant young men who have vision to see the importance of this kind of work and are willing to devote the large amount of time to these studies which is necessary. It is only by almost living in the laboratory for months and years that it is possible to assimilate the groundwork necessary for productive research of this character. It is vastly to the credit of these workers that they give this large amount of time to studies that are not financially productive, at least directly, and become so only as they accrue to the reputation of the investigator.

It is to be hoped that the budgets of

ophthalmological departments will some day be sufficient to include adequate remuneration for the clinicians who devote so much time to scientific investigation. Lawrence T. Post.

BOOK NOTICES

Allergy and immunity in ophthalmology. By Alan C. Woods, M.D. Buckram, octavo, 186 pages. Baltimore. The Johns Hopkins Press, 1933.

This is Monograph No. 1, from the Wilmer Ophthalmological Institute of the Johns Hopkins Hospital and University. It is dedicated to the memory of Hiram Woods, M.D., the father of the author. There is a foreword by William H. Wilmer, which points out the antiquity of speculations on inoculation and allergy, or idiosyncrasy. Jenner discovered their practical importance, and Pasteur furnished the foundations for a philosophy of this new world of biologic relations.

There are eight chapters devoted to: I. General considerations. II. Experimental studies. III. The relationship of allergy to focal reactions in the eye. IV. Allergic conjunctivitis. V. Antigenic properties and reactions of lens protein and uveal pigment. VI. Syphilis. VII. Tuberculosis. VIII. Therapeutic procedures. A full subject index and index of authors complete the book. Each chapter ends with a bibliography, of from 16 to 78 references.

Ophthalmologists are fortunate in having this introduction to a new and swiftly expanding field of medical literature, prepared by one deeply interested in it, but quite impersonal in his presentation of the facts, and able to present them without becoming a partisan in a warfare of contending theories and contradictory observations. To the student who is willing to give time and thought to the problems of physiology and pathology, raised by a long series of laboratory observations, this will be a reference book of great value. To the physician engaged in ophthalmic practice, it will give no false impression of certainty or finality. Beyond the range of facts that are known and can be applied, there is a broader zone of discovery, suggestion and speculation, of which we should also be conscious.

The last three chapters organize the facts gleaned from literature and laboratory research, with reference to their bearings on treatment. The enormous frequency of syphilis and tuberculosis, and their chronic course give importance to every suggestion, or even many speculations regarding them. In the last chapter the topical headings, Non-specific protein therapy, Autoserums, Vaccine and specific serum therapy, mass recent information bearing on therapeutic measures of great and current practical importance.

Edward Jackson.

Transactions of the American Ophthalmological Society, Volume 30, 1932. Wm. Fell Company, Philadelphia. 551 pages.

During the past year the society has lost five of its members: Dr. E. E. Holt, Sr., elected in 1883, Dr. B. Alexander Randall elected in 1885, Dr. George Derby elected in 1909, Dr. J. F. Shoemaker elected in 1911, and Dr. J. A. Lassalle, elected in 1931.

The Howe Medal of the Society was awarded to Dr. Frederick H. Verhoeff for his distinguished service to ophthalmology.

Space permits the mention of only a few of the interesting papers.

Dr. William H. Wilmer and Dr. Richard T. Paton described pantocain and its distinct advantages as a local anesthetic in ophthalmology. Dr. Joseph L. McCool and Dr. Howard C. Naffziger described the course of progressive exophthalmos. The cause was found to be swelling of the fibers of the extrinsic ocular muscles, loss of their striations, an infiltration with lymphocytes and plasma cells, and a condensation of the muscle fibrils into dense scar tissue. Relief was obtained by removal of the orbital plate, the roof of the optic foramen, and opening of the

ring of Zinn. Dr. F. H. Verhoeff and Dr. Merrill J. King described the cultivation of the leptotriches in cases of Parinaud's conjunctivitis; the reproduction of a similar clinical picture in rabbits and guinea-pigs following inoculation with the artificially cultivated organism and the recovery of the organism from the experimental lesion. Dr. C. S. O'Brien described the production of cataract in young rats on vitamin G. deficiency diet. The cataracts developed in about seventy days and frequently interstitial keratitis, conjunctivitis and swollen eyelids were observed. By the addition of vitamin G to the diet, the experimental lens changes could be arrested at any stage. Dr. Bernard Samuels discussed the significance of specific infiltration at the site of injury in sympathetic ophthalmia. The paper is profusely illustrated and offers sound evidence to the theory that sympathetic ophthalmia is caused by a bacterium whose portal of entrance is an opening in the eyeball. Dr. Jonas Friedenwald reported experimental work on allergy and immunity in ocular tuberculosis. He was able to desensitize tuberculous guinea-pigs by daily injections of tuberculin in graded doses. The rationale for the use of tuberculin in treating tuberculous infection is the production of perifocal desensitization. Dr. Arnold Knapp reported ten cases on the association of sclerosis of the cerebral basal vessels with optic atrophy and cupping in the presence of persistently low intraocular tension. The diagnosis of cerebral sclerosis was made by the x-ray findings. The results of central visual field studies were reported in detail by Dr. C. W. Rutherford who concluded that perimetry applied to the central visual field was capable of supplying more reliable information in patients with intracranial lesions accompanied by increased intracranial pressure than can be secured by any other diagnostic resource.

A short section is devoted to the exhibition of cases, new instruments and apparatus. The final section presents the theses of Drs. Thomas Dyer Allen, Edwin Blakelee Dunphy, Peter C. Kronfeld, George A. Leahey, Samuel P. Oast, Raymond J. Sisoon, and Morie Frederick Weymann.

Wm. M. James.

Transactions of the American Academy of Ophthalmology and Oto-Laryngology, 1932. Cloth, Octavo, 664 pages. Illustrated. Published by the Academy. Omaha, 1933.

The transactions of the thirty-seventh annual meeting are grouped in a volume corresponding to those of previous years. This volume is dedicated to Dr. Hal Foster. In the first section are included the president's address by Dr. S. Hanford McKee and a symposium on "The progress of general medicine in relation to eye, ear, nose and throat." The first paper, by Dr. O. H. Perry Pepper, of Philadelphia, was "Blood dyscrasias in relation to diseases of the eye, ear, nose and throat." Dr. Norman M. Keith, Rochester, Minnesota, read a paper on "Cardio-vascular diseases in relation to the retina." "Operative treatment of migraine and observations on the mechanism of vascular pain" followed, by Dr. Wilder Penfield, Montreal, and "Diseases of the eyes, ears, nose and throat from the metabolic point of view" by Dr. I. M. Rabinowitch, Montreal. The symposium was summarized by Dr. Perry G. Goldsmith, Toronto.

In the section devoted to the Ophthalmologic Sessions, ten papers are given, on a variety of subjects. Outstanding is the report by Dr. Daniel B. Kirby, of New York, on the "Study of disturbances of carbohydrate metabolism in relation to cataract." This is a 70-page article dealing most comprehensively with the subject, the final report by the Academy Research Fellow in Ophthalmology.

The Ophthalmologic Sessions occupies 218 pages, the Oto-Laryngologic Sessions 132 pages. The illustrations are excellent throughout. The Teachers' Section includes important reports on undergraduate and graduate study. A long list of representative names of instructors and their subjects clearly shows this most valuable work of the Academy. A new eye shield, intraocular

forceps, tenotomy hook, bed for head cases, thermos irrigating bottle and nasal trephine occupy the instrument section. The volume ends with the minutes, necrology list, directory and index, in 164 pages.

H. Rommel Hildreth.

Diseases of the eye; by Ernst Fuchs, fifteenth German edition as revised by Maximilian Salzmann, translation into English by E. V. L. Brown, professor of ophthalmology, University of Chicago; being the tenth English edition. 641 pages, cloth bound, with 255 illustrations in the text and 41 colored figures. J. B. Lippincott Company, price seven dollars.

For many years Fuchs' "Lehrbuch der Augenheilkunde," first published in 1889, has been as it were the Bible of ophthalmologists all over the world; and perhaps no other medical book has been translated into so many different languages. The nine previous translations into English, issued in 1892 and other years down to 1924, were from the hand of Alexander Duane, and justly enjoyed a very wide circulation. Upon the basis of Duane's translations, which were excellent and were supplemented by valuable material introduced by the translator to meet the needs of his English-speaking readers, Fuchs was quoted as authority, times without number, in essays and in public discussions on ophthalmologic topics.

The fifteenth German edition was prepared by Professor Salzmann, himself a pupil of Fuchs, eminent in the specialty, and the draftsman of most of the drawings for the excellent woodcuts which had graced the previous editions; and to that edition a most important addition by Salzmann was the series of forty-one colored figures now included in the English translation. Unfortunately no translation of the fifteenth edition into English appeared until this year.

The old volumes of Fuchs are for the most part still authoritative and reliable; and for libraries, private or public, which do not possess an earlier translation this tenth English edition will be relatively indispensable. Being already eight years old as to the original German, it cannot be expected to be quite up-to-date. For example, nothing is said about the recent surgical treatment of retinal detachment, the newer filtration operations for simple glaucoma, or the excellent results recently obtained in tattooing the cornea with gold or platinum salts. Using appreciably heavier paper than previous English editions, it contains about 350 fewer pages, and it has omitted the chapters on examination, refraction, and operation, as well as the special supplemental chapter on refraction which was written by Dr. Duane.

Essentially the new Fuchs, like the old, may still be consulted and quoted as one of the best and most comprehensive textbooks on ophthalmology. But it is to be regretted that this new translation lacks the elegance, smoothness, and complete reliability of the translations made by Duane. In the main it will be comprehensible, although here and there rather less so to those whose knowledge of foreign languages is not adequate to afford them a more or less instinctive appreciation of the difficulties encountered by the translator.

Dr. Brown undertook this translation before Fuchs' death in 1930. The job was an enormous one and could only have been undertaken as a labor of love. The reviewer cannot help suspecting that Dr. Brown found this voluntary duty so onerous that he had to delegate much of the work of translation to someone less competent than himself as to the English idiom. The minor and more or less unimportant peculiarities of inadequate translation are almost everywhere manifest, and a number of pages of the volume might have been saved by mere avoidance of superfluous use of the article "the," so much commoner in German than in English usage. In almost every paragraph the sensitive reader will be conscious of construction and phraseology which are un-English. At a number of points there are mistranslations which will be puzzling if not actually misleading.

In the chapter on injuries, where the German clearly speaks of the youthful sport of exploding percussion caps, with the result that fragments of the covering of the cap are found in the injured eye, the translation renders "percussion cap" as "inflammatory material", and says that "one then finds fragments of the investment" in the eye. A rifle shot is spoken of as an "infantry charge", the German word "durchaus" is rendered as "throughout" where it means "quite", the word for "blood charcoal" is given as "the blood carbons", the expression for "squeezing the lids together" is translated as "knifing together of the lids" (because of the entirely misleading appearance of the German word "Zukneifen", meaning "to squeeze"), the word for "scar" or "cicatricial membrane" appears as "sward", the word for "extensive" as "wide-going", the word for "halo" as "court", and so on.

Exception may also quite properly be taken to the oft-repeated employment, in an English translation, of the Latin names for chemical compounds, such as "argentum nitricum" (silver nitrate), "plumbum aceticum" (lead acetate), and "zincum sulfuricum" (zinc sulphate). Perhaps more mildly objectionable is the too slavish adherence to the German custom of using Latin terminology for anatomical or pathological names, an excellent example being "membrana pupillaris perseverans" for "persistent pupillary membrane."

The present volume is praiseworthy in that it represents a great amount of conscientious labor for the purpose of rendering the latest edition of this great textbook available to readers of English. Its value would have been materially enhanced by more critical editorial work. W. H. Crisp.

Industrial test charts. Published by the American Medical Association. Price $1.60 per set.

This set consists in a visual test card of the American Medical Association rating, for use at 20 feet, measuring 10 by 28½ inches; a 4 by 8 inch American Medical Association rating, reading card; a block of industrial visual field charts; a block of industrial motor field charts and a reprint of the method of appraisal of loss of visual efficiency, approved by the House of Delegates of the American Medical Association.

The test chart contains the usual black block letters on white background. Above each line on the left are notations of visual acuity in decimals and in fractions and on the right the percentage of visual acuity. There is a five percent difference between each succeeding line.

The American Medical Association rating, reading card is to be held 14 inches from the eye. The visual percentage here also is noted above the reading line on the right but is not based on a five percent difference between the lines, following as it does the Snellen notation for near.

The industrial visual field charts are similar to the usual field charts except that the oblique axes illustrated are those at 45°, 135°, 225°, and 315°, instead of the customary 30°, 60°, etc. On the back of each double chart are spaces for name, date, percentage of visual field efficiency of each eye; a rectangle appropriately spaced for recording field limit in each meridian and finally directions for taking the field and estimating visual field efficiency.

The industrial motor field chart has on one side a chart composed of twenty, equal sized, rectangular spaces; on the reverse side are spaces for name, date, percentage of efficiency of muscle function, a table illustrating the method of estimating the percentage of efficiency and directions as to how to make these determinations.

This set will prove time saving to those doing industrial work. The criticism lies not in the charts but in the fact that some State legislatures have modified the findings of the committee just enough to make impossible the use of the system exactly as outlined. Minor changes may therefore be necessary to adjust to these variations.

Lawrence T. Post.

Bulletin de la Société Belge d'Ophtalmologie, 1932, no. 65. Paper covers, 133 pages. Brussels, Imprimerie Médicale et Scientifique, 1932.

This volume contains 127 pages of scientific reports, several of them illustrated by photographs and plates, together with a list of active, associate, and honorary members of the Society. Twenty contributions were read before the Society at this meeting. Abstracts of most of them will appear in the abstract department of this Journal.

J. B. Thomas.

CORRESPONDENCE

Epitaph on an "Oculist"

On a person, who, being unsuccessful as an Oculist, became a cheap Tallow-Chandler.

So many of the human kind
Under his hands became stone-blind,
That for such failings to atone,
At last he left the trade alone,
And ever after, in despite
Of darkness, liv'd by giving light.
But Death, who has Excisemens' pow'r
To enter houses any hour,
Thinking his light grew rather sallow,
Snuff'd out his wick, and seiz'd his tallow.

Mr. Wood, the genial and thoughtful Librarian of the Royal College of Surgeons, London, who frequently sends to me "scraps" of interest on ophthalmological lore, has sent this "epitaph" concerning an "Oculist" which he culled from "The Public Advertiser" for 1789.

The term "Oculist" was applied at that period of medical history, to those "quacks and charlatans" and other irregular practitioners who attended to ophthalmic cases. Indeed, the regular profession declined to treat those so afflicted, and it was not until after the establishment of the Royal Ophthalmic Hospital, some time about 1810, that reputable surgeons would deem such cases worthy of their time and attention. It was not until several years later that the profession in England ceased to despise those who had entered on such practice. Even Wardrop, whose "Essays on the morbid anatomy of the human eye," a little work describing a number of diseases, which was the first book in English on the pathology of the eye, jeered at and villified those who had begun to "specialize" their practice and at whose efforts he showed his contempt.

In a perusal of the "Intercepted letters" in the early issues of "The Lancet," one can find ample records of the attitude manifested by those who willingly dismissed their patients into the hands of such an one as he, over whom the above were graven.

(Signed) Burton Chance

Comments on "Secondary infections in trachoma"

There are one or two points in the interesting editorial on "Secondary infections in trachoma" in the February number on which I beg to be allowed to comment.

The article on trachoma in the System of Bacteriology of the Medical Research Council, Vol. VII, page 247, states that "tracoma does not supervene on a normal conjunctiva, but that some form of inflammatory reaction is necessary before the condition appears." This is contrary to my experience of twenty years in a trachomatous country as regards a certain proportion of cases, for the disease may begin quite insidiously, without any inflammatory phenomena, and be discovered by accident. However more usually, at any rate in hot climates, it is preceded by some conjunctival inflammation.

Trachoma is invariably a chronic disease; any acute signs are significant of a super-imposed infection.

One of the earliest signs of trachoma is the appearance of trachomatous pannus which can usually be detected at the same time that trachoma follicles are first seen, if the corneal microscope and slitlamp are used. It is generally believed that trachoma follicles appear on the conjunctiva of the upper tarsus, before the trachomatous infiltration of the superficial layers of the cornea, which we recognize as pannus, appears. I am very chary of making a diagnosis

in doubtful cases of trachoma, from an inspection of the everted lid, in the absence of slitlamp observation of pannus. This I have taught for twenty years.

Scars on the tarsus may have a non-trachomatous origin, but when found in conjunction with follicles and pannus, confirm the diagnosis of trachoma.

My opening paper at the Fourteenth International Congress of Ophthalmology at Madrid dealt with the role of the constitution in infection by trachoma. Both I and my Egyptian colleages have never had any doubt that there is no more reason to put the blame on trachoma infection on any constitutional disability than there is in the case of measles or smallpox.

The use of a mixed bacterial vaccine for the treatment of trachoma, which as we know is not caused by any known organism, is not only unscientific but savors of charlatanism.

It is good to hear that Thygeson believes that the etiology of trachoma "will be finally solved before too many years have elapsed." Trachoma shares with hook-worm disease and malaria, the distinction of claiming a greater number of sufferers throughout the world than does any other disease. Interest in the disease has been greatly stimulated since Morax founded "La Revue Internationale du Trachome," in 1924, which journal publishes papers in various languages. Also after the Thirteenth Congress of Ophthalmology three years ago, an International Committee was formed to study trachoma in all its aspects, of which Dr. Park Lewis is the American vice-president. So we hope that Thygeson will prove to have been a true prophet.

I beg to acknowledge gratefully the repeated kindnesses of the editors of the American Journal of Ophthalmology and of its predecessor, the Ophthalmic Record, when referring to my work.

(Signed) A. F. MacCallan.

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, and history
19. Anatomy and embryology

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1. GENERAL METHODS OF DIAGNOSIS

Abramowicz, I. **Research on the sign of Charles Bell with the diaphanoscope.** Ann. d'Ocul., 1933, v. 170, Feb., pp. 160-161.

The author transilluminates through the lower lid. The subject is directed to close the eyes gently and the red reflex from the pupil is followed as it shines through the upper lid. The reflex shows by the eye turning up and out.

H. Rommel Hildreth.

Adrogué, E., and Lagos, J. J. **Perimeter and normal isopters.** Boletin de Informacion Oft., 1932, fifth year, Sept.-Oct., pp. 265-269.

The author particularly recommends a perimeter with a large arc and also a large central disc, the center of which is 1.2 meters from the patient's eye; the apparatus being attached to the wall of the dark room, and using a large battery of lamps for artificial illumination. The isopters found with this apparatus do not differ from those previously recorded.

W. H. Crisp.

Berens, C., and Kern, D. **A hand campimeter.** Trans. Sect. on Ophth. Amer. Med. Assoc., 1932, p. 349.

A hand campimeter measuring 29 by 29 cm. with the usual degree markings, including a 25° circle and vertical and horizontal lines every 4°, these markings being on both sides of the board, is presented. The distance from the cornea to the point of fixation on the campimeter is 27 cm. There are slits in the blind spot areas and a hole at fixation through which the test object may be passed, the ophthalmologist standing behind the campimeter.

The numerous advantages claimed for this campimeter include accommodation without strain even in presbyopic patients, accurate study of the blind spot, accuracy in adjustment of radius to obviate errors, reversibility for right and left eye, and convenience for bedridden patients.

George H. Stine.

Comberg, W. **A new electric hand ophthalmoscope which can be used for direct and indirect ophthalmoscopy.** Zeit. f. Augenh., 1933, v. 79, Jan., p. 355.

The lamp is in the lower end of the handle. Over it is placed a convex lens which intensively illuminates a diaphragm with a six millimeter opening. A second convex lens of twenty diopters which is placed five centimeters from the diaphragm produces a circular image four to five centimeters in diameter and thirty to forty centimeters from the mirror of the ophthalmoscope. This is just the place where the large convex lens is held in indirect ophthalmoscopy

and if one chooses a lens four to five centimeters in diameter none of the light is lost. To increase the size of the fields a fifty diopter lens is interposed between the light and the mirror, and the apparatus is mechanically so arranged that this can easily be done without even interrupting inspection of the fundus. F. Herbert Haessler.

Diaz Caneja, E. **Photography of the ocular fundus.** Arch de Oft. Hisp.-Amer., 1933, v. 33, Feb., p. 81.

The advantages of fundus photography over fundus drawing, apart from the rarity of the ophthalmologist-artist combination, are that it is more rapid and exact, permits earlier diagnosis from incipient disturbances of level, and helps in localization. Sepia-colored photographs are preferred. A single transparency already produces a sensation of relief, two identical transparencies examined stereoscopically heighten it, and the interposition of eccentrically placed circular diaphragms still further brings out the relative relief so that stereoscopic pictures are almost never required. M. Davidson.

Engelking, E., and Hartung, H. **A new adaptometer for clinical use.** Klin. M. f. Augenh., 1932, v. 89, Dec., p. 763. (Ill.)

The new adaptometer allows of simply and readily ascertaining, for larger areas of the retina, light sensitiveness and adaptation. C. Zimmermann.

Fischer, F. P. **Electrostatic measurements of the living eye.** Arch. f. Augenh., 1932, v. 106, Dec., p. 428.

To obtain electrostatic measurements of the living eye, Fischer used Perveca's electrometer, Nistler's multielectrodes, and gold wire as electrode material. He gives the reaction of the various structures of the eye and discusses their possible significance in relation to the barrier between the blood and aqueous. Frederick C. Cordes.

Friedenwald, J. S. **Demonstration of a new ophthalmoscope.** Trans. Sect. on Ophth. Amer. Med. Assoc., 1932, p. 359.

With this instrument slitlamp microscopy of the fundus without the use of a corneal contact glass is possible. The illuminating and observing systems are adjustable for both dilated and contracted pupils; a reflexless view of the fundus being obtainable even through a pupil of minimal size. Cylindrical lenses to correct astigmatism and filters to reduce the chromatic aberration of the average normal eye may be incorporated in the system. When higher magnification is desirable a small telescopic ocular, overcorrected for spherical aberration, may be inserted. Small retinal arterial branches are brought into view and early changes in a variety of lesions may be recognized earlier than with other instruments.

George H. Stine.

Mayer, L. L. **Visual fields with minimal light stimulus.** Arch. of Ophth., 1933, v. 9, pp. 353-367.

In normal cases the author studied the reaction of the peripheral parts of the field to light stimuli of minimal duration. The general tendency to refer stimulation from peripheral portions of low sensitivity to more central ones of higher sensitivity reduced the demonstrable amount of change as the periphery was approached. M. H. Post.

Towbin, B. G. **Vital staining of the eye in connection with the reticulo-endothelial system.** Graefe's Arch., 1933, v. 129, p. 387.

Vital staining carried out on fifteen young rabbits and two young guinea-pigs presented an elective character. While part of the structures colored diffusely, a considerable number of cells took the stain in the form of granules and other parts of the eye remained colorless. The diffuse staining was strongest in the sclera, weaker in the connective tissue of the conjunctiva and eyelids, very weak in the iris, almost imperceptible in the cornea. Histiocytes were most numerous in the retrobulbar cellular tissue and the episclera; were found in gradually decreasing numbers in the bulbar conjunctiva, the palpebral conjunctiva, the stroma of the ciliary processes, the connective tissue layers of the Harderian and lacrimal glands, the choroid, the ciliary body, the con-

nective tissue of the optic nerve, and the sclera. H. D. Lamb.

2. THERAPEUTICS AND OPERATIONS

Berens, Conrad. **An eye speculum.** Trans. Sect. on Ophth. Amer. Med. Assoc., 1932, p. 357.

The author presents a new speculum made of chrome-plated steel which is 91 mm. long with a curve adapted to fit the contour of the average face. The lid plates are solid and are adapted to the branches of the speculum by a rotating joint. These lid plates are supplied in two sizes, 19 mm. in breadth for adults and 14 mm. for children. There is an especially designed catch between the branches of the speculum. A coil spring furnishes the necessary tension for separating the branches.

The advantages claimed are ease of manipulation, conformity to facial contour, and absence of protrusions in which sutures may become entangled.

George H. Stine.

James, W. M. **Stovarsol in the treatment of ocular syphilis.** Jour. Missouri State Med. Assn., 1933, v. 30, Jan., p. 33.

The author reports his results in nine cases of ocular syphilis in which stovarsol was used either alone or in conjunction with intramuscular injections of mercury succinimide. Six of these cases were diagnosed as interstitial keratitis, two uveitis, and one dendritic keratitis. The results obtained were very good except in one case. Stovarsol was given by mouth 0.25 gm. three times a day. Those cases that received mercury succinimide were given 0.02 gm. intramuscularly once a week. The serological results were very good. Eight in this series had a strongly positive Wassermann reaction. Five of these became negative in from nine to thirty-two weeks. Tolerance to the drug was extremely high in this series.

M. E. Marcove.

Klein, Miklos. **The absorption of eye ointments. Part 2, The absorption of atropin.** Graefe's Arch., 1933, v. 129, p. 413.

Dilatation of the pupil was obtained in normal human eyes with 5 cg. of an ointment of 1:200,000 strength, corresponding to 0.00025 mg. of atropin. The ointment was much more effective than a watery solution. H. D. Lamb.

Vail, D. T. Jr. **Conjunctival retractor for ignipuncture.** Trans. Sect on Ophth. Amer. Med. Assoc., 1932, p. 364.

This instrument, a modification of the author's father's lid hook, is designed to retract the conjunctiva and expose the sclera in the Gonin operation for retinal detachment. It may be used with or without the eye speculum. If it is used without the speculum, the flat blade will also act as an elevator of either the upper or the lower lid.

George H. Stine.

3. PHYSIOLOGIC OPTICS, REFRACTION, AND COLOR VISION

Abramowicz, I. **A new procedure for determining the correctness of a cylindrical lens by means of the ophthalmometer of Javal-Schiötz.** Ann d'Ocul., 1933, v. 170, Feb., pp. 162-164.

An attachment is fitted to the ophthalmometer to hold the glasses to be checked. An artificial cornea is placed behind the lens. The astigmatism caused by the lens is measured in the usual manner, the difference in power between the two principal meridians representing the power of the lens.

H. Rommel Hildreth.

Bothman, Louis. **The basal metabolic rate in progressive axial myopia.** Trans. Sect. on Ophth. Amer. Med. Assoc., 1932, p. 261.

The author reports a series of thirty-eight cases of progressive axial myopia (school myopia), all in patients under twenty years of age, only seven over fifteen. The ratio of incidence in males and females was almost 1:2. The increase of myopia showed a wide range; the greatest increase was 4.25 diopters in one case and the average increase was 1.39 diopters. The basal metabolic rates also varied greatly. The high rate in one patient was —7 percent and the lowest —36 percent, the average —19.3 percent. That thyroid deficiency may be a factor in this myopic group is supported by the facts that most of the patients

were overweight for their age and height, and that many underweight patients with low rates gained while taking thyroid. Several patients whose myopia had ceased to progress had plus rates. Since the average basal metabolic rate in progressive myopia is minus, usually falling within the lowest normal and frequently in the abnormal range, and since the low basal rate usually indicates hypothyroid function, the author concludes that hypothyroidism is closely linked with progressive axial myopia. (Tables and discussion.)

George H. Stine.

D'Osvaldo, E. **The acuity of vision in diminishing light.** Ann. di Ottal., 1932, v. 60 Sept., p. 633.

Graphs of two subjects respectively with pupils dilated and with pupils normal, as to the acuity of vision under diminishing light, showed different curves. From the optotype through the dilated pupil the eye receives more light, but the astigmic and spherical aberration with the dilated pupil is exaggerated and the definition of the image thus lessened. Park Lewis.

Dufour, Marcel. **The theory of correcting lenses giving exact images.** Ann. d'Ocul., 1933, v. 170, March, pp. 237-243.

This is a mathematical treatise not suitable for abstraction.

H. Rommel Hildreth.

Ferree, C. E., and Rand, G. **Lighting without glare.** Arch. of Ophth., 1933, v. 9, pp. 344-352.

This paper continues previous studies of the authors in describing for illumination a rectangular and a circular unit which eliminate glare to a maximum degree. M. H. Post.

Greeves, R. A. **Temporary changes in the refraction of the eye in diabetes.** Brit. Med. Jour., 1932, no. 3751, Nov., p. 963.

In two cases myopia due to diabetes disappeared or became less when the blood sugar approached normal. The author believes that there is a relationship between transient errors of refraction and blood sugar, hyperopia coinciding with hypoglycemia and myopia with hyperglycemia. He agrees with Duke-Elder that these changes are due to the changes in the refractive index of the lens. M. E. Marcove.

Himsworth, H. P. **Temporary visual disturbance as an initial symptom of diabetes mellitus.** British Med. Jour., 1932, Dec. 31, p. 1184.

Himsworth found that thirty-four percent of patients complained of temporary visual disturbances early in the disease. Increase in blood sugar caused tendency to myopia and decrease toward hyperopia. The author infers that the visual disturbance is temporary because it is dependent upon changing blood sugar. No patient with renal glycosuria complained of the visual disturbances. Ralph W. Danielson.

Jackson, Edward. **Changes in ocular refraction.** Amer. Coll. of Surgeons. 1932, v. 16, Dec., p. 50.

The author traces the changes in refraction during the various periods of life. Such changes require reexamination whenever symptoms of eye-strain arise, particularly after middle age.

M. E. Marcove.

Kravkov, S. W. **The irradiation effect of light in the eye as modified by associated stimuli of seeing, hearing, and smelling.** Graefe's Arch., 1933, v. 129, p. 440.

It was found that the effect could be increased by simultaneous stimulation of the fellow eye, or by stimulation of smell or hearing. With associated stimulation of hearing, the increased effect only occurred when the stimulated ear was contralateral to the eye under observation. But in many persons binaural stimulation produced a greater increase than the monaural stimulation of the more effective ear. In paracentral sight, the associated stimulus was effective only when the ear stimulated was contralateral to the tested half of the retina. H. D. Lamb.

Rischard, Michel. **Parasympathetic poisons and accommodation.** Ann. d'Ocul., 1933, v. 170, March, pp. 218-237.

Using pilocarpin and atropin, by anatomical study it is shown in regard to the iris that if the parasympathetic nerve is excited the sympathetic is paralyzed (pilocarpin) and if the parasympathetic is paralyzed the sympathetic is excited (atropin). The circular muscle of the ciliary body, having a free border as does the iris, is supplied by the sympathetic and dilates on contraction of the fibers, whereas the parasympathetic innervates the radiating muscle fibers. Accommodation is explained as follows: The parasympathetic nerve is stimulated, causing the longitudinal muscle fibers of the ciliary body to contract, pulling the choroid forward and thus relaxing the posterior fibers of the zonule. At the same time the parasympathetic impulse inhibits sympathetic action, thus relaxing the circular muscle, whose free border moves toward the lens, releasing tension on its attached zonular fibers.

H. Rommel Hildreth.

4. OCULAR MOVEMENTS

Alexiades, F. **Controlled tenotomy.** Arch. d'Opht., 1933, v. 50, March, p. 212.

Controlled tenotomy as practiced by the writer is described as follows. A silk suture is placed through the tendon before it is cut. After cutting the tendon both ends of the suture are brought out through the tendon stump and tied in a single knot. On the first or second day after operation this suture is drawn up so that there is only a slight overcorrection, and the knot is then completed, to be left in place for ten days. Such a tenotomy should be used as an adjunct to advancement wherever needed. (Two illustrations.) M. F. Weymann.

Berens, Conrad. **Resection operation for strabismus.** Trans. Sect. on Ophth. Amer. Med. Assoc., 1932, p. 282.

The principal features suggested in the technique of resection by the Reese method are: (1) a curved conjunctival incision with the concavity toward the cornea, far from the stump of the muscle, to reduce visible postoperative scarring, and to lessen tendency to granulation and infection; (2) winged incisions from the insertion of the tendon and no disturbance of the capsule of the muscle, so as to decrease the tendency of the muscle to become atrophic; (3) two doubly-armed sutures so placed in the muscle that their action may be increased after the conjunctival wound is closed, and their bite so secure that the dressing may be removed the day after operation. The author now performs many more retroplacement than resection operations. (Eight figures and discussion.)

George H. Stine.

Coppez, H. **The syndrome of Marin Amat.** Bull. de la Soc. Belge d'Opht., 1932, no. 65, p. 88.

The writer reports a case of synkinesis between the facial nerve and the motor branch of the trigeminus, a rare condition first described by Marin Amat under the title "inverse Marcus Gunn syndrome". J. B. Thomas.

Levin, Michael. **Ocular torticollis in children.** Amer. Jour. Dis. of Children, 1932, v. 44, Nov., p. 1026.

Ocular torticollis, head tilting from paralysis or defects of the extraocular muscles, is emphasized because of its importance in pediatric practice. Correction of the ocular defect is the cure of the torticollis. Proper refraction is essential. M. E. Marcove.

Schick, A., and Silbermann, J. **Paralysis of ocular muscles in diabetes mellitus.** Wien. klin. Woch., 1932, v. 45, Oct. 7, p. 12.

Paralysis of the left external rectus was encountered in a woman of fifty-eight years with hypertension of 190/70, a blood sugar 224 mg., and urine sugar-free. All other examinations were negative and the paralysis gradually disappeared when the blood sugar reached 164 mg. In the second case paralysis of the external rectus developed in a known diabetic and further examination revealed pathologic changes within the sella. Beulah Cushman.

Terrien, F. **Remarks concerning the limitations of tenotomy.** Arch. d'Opht., 1933, v. 50, March, p. 219.

Tenotomy should only be used in marked degrees of strabismus, and

should be limited exclusively to division of the tendon without disturbing the surrounding check ligaments, the conjunctiva, and other structures. It should always be unilateral, whether accompanied by advancement or not. It should not be practiced before the age of ten years, as after that age its effect is lessened. The writer has found the most efficacious method to be partial section of the tendon from each side until only a few central strands remain attached to the globe. M. F. Weymann.

5. CONJUNCTIVA

Beigelman, M. N. **Reticular fibers in some hyperplastic diseases of the conjunctiva.** Arch. of Ophth., 1933, v. 9, pp. 381-391.

The author gives some of the varying points of view as to the nature of these fibers, and presents photomicrographs illustrating their appearance in follicu-losis of the conjunctiva, trachoma, vernal catarrh, and Parinaud's conjunctivitis. M. H. Post.

Bengtson, I. A. **Bacterium-granulosis conjunctivitis compared with that produced from human trachoma.** U. S. Public Health Reports, 1932, v. 47, Dec. 9, p. 2281.

No protection was afforded in either series, so that definite conclusions cannot be drawn in regard to the immunological relationship of the two conditions. It appears that the condition induced by direct transfer is less readily transmissible than that induced by inoculation. The different appearance of the lesions in man and in animals is probably due to greater resistance to the disease on the part of the monkey. M. E. Marcove.

Lehrfeld, Louis. **Sodium carbonate (monohydrated) in the treatment of vernal conjunctivitis.** Jour. Amer. Med. Assoc., 1933, v. 100, March 18, p. 812.

The author uses sodium carbonate (monohydrated) in solution during the active stages of vernal conjunctivitis, both limbal and palpebral; five or ten grains, preferably five, to the ounce of water, three drops instilled four times daily. The eye is also bathed with cold boric acid solution by means of an eye cup, seven times daily. The author found desensitization slow, tedious, and often ineffective; and radium of limited use in relief of symptoms and then only in the hands of expert radiologists. Patients were remarkably relieved of the itching and the discharge gradually disappeared. George H. Stine.

Pillat, A. **Physiologic content of pigment in the conjunctiva of Chinese: some remarks on normal and on pathologic pigmentation.** Arch. of Ophth., 1933, v. 9, p. 411-445.

Seven cases were studied, between the ages of fourteen and forty-three years. Sections were taken from the nasal, temporal, upper, and lower bulbar conjunctiva and each fornix. There were four principal types of pigment: solid pigment caps, chiefly in the basal cell layer; pigment caps in all the conjunctival layers; small, dotted, diffuse pigmentation, chiefly of the basal layer; and scarce pigment granules in the basal layer. Dendritic pigment was seen in the basal layer. The author attempts a definition of physiological pigmentation. M. H. Post.

Stuppel, R. **Trachoma in Fiji—an original investigation.** Brit. Jour. Ophth., 1933, v. 17, Feb., p. 88.

Of the Fijian population, some 92,000 in number, at least 20,000 are affected. The condition is not of foreign origin. Children are never brought for examination or treatment, and the disease is discovered only in its more advanced form. (Thirteen illustrations.) D. F. Harbridge.

6. CORNEA AND SCLERA

Doggart, J. H. **Superficial punctate keratitis.** Brit. Jour. Ophth., 1933, v. 17, Feb., p. 66.

The author believes that this term should be broader in its scope than as originally applied by Fuchs, who in 1889 studied thirty-eight cases. The onset resembles that of an acute catarrhal conjunctivitis. Corneal lesions manifest themselves about four days after the first symptoms, in the form of small

round gray dots showing a preference for the central part of the cornea immediately beneath Bowman's membrane. The author describes his own cases under three main headings: (a) nonrecurrent superficial punctate keratitis, in which the main lesions are situated in the anterior layers of the substantia propria; (b) multiple epithelial erosions, with or without involvement of the substantia propria; (c) miscellaneous conditions in which multiple superficial lesions of the cornea are a prominent feature. Of 43 cases of (a), the Fuchs type, all except four were unilateral, about one-third showed impairment of sensation of touch and in all cases there was complete recovery. The multiple erosion type is often the sequel of some debilitating condition like influenza, but may result from an irritating substance such as mustard gas. With the biomicroscope there are gray irregularities appearing to consist of broken or distorted corneal lamellæ. While vision may not be impaired, recurrent abrasion may result in serious damage to vision. (Illustrative cases, thirty-three references, two photomicrographs.) D. F. Harbridge.

Follet, Jacques. **Hereditary and familial keratitides, corneal degenerations and opacities.** Arch. d'Opht., 1933, v. 50, March, p. 161.

The biomicroscope has yielded new descriptions for the familial type of corneal degenerative lesion. The writer divides these affections into two main groups, congenital heredo-familial, of the superficial or deep; and late heredo-familial keratitides or degenerations and dystrophies. A minute description of the biomicroscopic appearance of each type of lesion is given, and also genealogical tables of affected families wherever possible. M. F. Weymann.

Hoch and Baurmann. **Concerning the etiology of encephalitis.** Klin. Woch., 1932, no. 35, Aug. 27, p. 1451.

Hoch and Baurmann question the work which Knauer and Jaensch reported on the development of superficial punctate keratitis in the rabbit's cornea with fluid from encephalitis patients. They used fluorescein to determine the appearance of the keratitis. They found that keratitis would frequently occur spontaneously in rabbit's eyes, as reported by Hippel thirty years previously. Duplicating the work of Knauer and Jaensch, they were unable to find that superficial punctate or dentritic keratitis developed in any important number of cases.

Beulah Cushman.

Katz, Dewey. **Total and complete keratoplasty with a conjunctival flap.** Arch. of Ophth., 1933, v. 9, pp. 331-337.

The patient had lost the sight from fatty dystrophy of the cornea. The transplant took well, but eventually the transplanted cornea became opaque and vascularized. The blood of the donor and that of the recipient were not of the same type. Increased intraocular tension was present, as well as adhesion of the iris to the cornea. M. H. Post.

Meding, C. B. **Foreign body in orbit. Foreign body in anterior chamber. Ulcus serpens.** Arch. of Ophth., 1933, v. 9, pp. 407-410. (See Section 16, Injuries.)

Rados, Andrew. **Traumatic epithelial cysts within the eye.** Arch. of Ophth., 1933, v. 9, pp. 392-406.

Perforated corneal ulcer in a man of twenty-three years was followed by a cyst in the anterior chamber. The author reviews the classification of corneal cysts. M. H. Post.

7. UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Claes, E. M. J. **Hypopyon of the posterior chamber with secondary iridocyclitis and glaucoma.** Bull. de la Soc. Belge d'Opht., 1932, no. 65, p. 91.

This is a histologic study of the enucleated eyeball, each region of the globe being described in detail. (Two photomicrographs.) J. B. Thomas.

Mintscheff, P. **Anisocoria in dogs and cats associated with peripheral inflammatory processes.** Graefe's Arch., 1933, v. 129, p. 379.

A peripheral inflammatory process, in the absence of any other condition

capable of producing anisocoria, produced unilateral mydriasis—the pupillary inflammatory reflex—which persisted as long as the peripheral inflammation. Pressure upon the inflammatory focus caused latent anisocoria to become visible and manifest to become more pronounced. H. D. Lamb.

Van Lint. **Episcleral traumatic abscess with partial contiguous iritis: pathogenesis of sympathetic ophthalmia.** Bull. Soc. Belge d'Opht., 1932, no. 65, p. 13.

The author reports a case of episcleral abscess with iritis confined to the adjacent portion of the iris, and states his belief in the toxic rather than bacterial origin of the localized inflammation, the toxins passing directly through the sclera. This pathogenesis of infection by proximity is also applied by the author to sympathetic ophthalmia. He offers two arguments in favor of his hypothesis. J. B. Thomas.

Villard, H., and Dejean, C. **Cysts of the iris.** Arch. d'Opht., 1933, v. 50, March, p. 194.

This instalment deals with congenital cysts, divided into three types according to pathogenesis; namely, cysts by inclusion, cysts by cleavage of the anterior or mesodermal leaf, and cysts by cleavage of the posterior or retinal leaf. Inclusion cysts, simple or dermoid, probably arise from epithelium included in the iris during embryonic development. Cysts from cleavage of the mesodermal leaf are produced by retention of liquid in the iris stroma between the two mesodermal layers. They are lined with endothelium. During embryonic development a portion of the posterior leaf of the iris remains between its two layers of pigment epithelium to form the annular sinus. Failure of obliteration of portions of this sinus by coaptation of the two leaves of epithelium may lead to formation of many of the cysts of the posterior layer of the iris. The writers believe that in their case the cyst arose from the annular sinus. (Eleven illustrations.) M. F. Weymann.

8. GLAUCOMA AND OCULAR TENSION

Gault, E. L. **Results of operative treatment of chronic glaucoma.** Med. Jour. Australia, 1932, v. 2, Dec., p. 735.

The author tabulates results of forty-seven cases observed over periods of five to ten years or more. He concludes that there is no such disease as chronic simple glaucoma without increased intraocular pressure. He states that in the majority of cases operation should be performed as soon as the diagnosis is made. He does not believe that there is any risk of precipitating blindness in cases in which operation is undertaken with the field approaching the fixation point. M. E. Marcove.

Kalt, E. **Anatomical alterations in congenital hydrophthalmos.** Ann. d'Ocul., 1933, v. 170, Feb., pp. 97-115.

The author concludes that in the majority of cases the primary lesion is an infection of the vascular system of the eye: the central vessels of the optic nerve, the anterior and posterior ciliary vessels, the venæ vorticosæ, and the vessels of the choroid. The intraocular hypertension is caused by a vasomotor disturbance, in turn caused by toxic substances from the diseased vessels, and followed by atrophy of the uveal tract and finally obstruction of the canal of Schlemm. (Twelve photomicrographs.) H. Rommel Hildreth.

Pillat, A. **Statistics on primary glaucoma in China.** Graefe's Arch., 1933, v. 129, p. 299.

During the author's four years' service at Peking, among 12,933 eye-patients there were 144 or 1.11 percent suffering from glaucoma, about equally divided as regards sex, although the prevalence of glaucoma among all the female eye-patients was about three times greater than among all the male eye-patients. The men with glaucoma included 11 younger than 45 years, 17 between 45 and 55 years, and 42 older than 55 years; for the women with glaucoma the corresponding numbers were 13, 18, and 48. Among the 144 patients 10 showed involvement of but one eye. Acute glaucoma was present in

14 eyes or 5.0 percent, chronic glaucoma in 107 eyes or 38.5 percent.

H. D. Lamb.

9. CRYSTALLINE LENS

Badot. **The ocular complications of diabetes. Is diabetes a contraindication to operation?** Bull. de la Soc. Belge d'Opht., 1932, no. 65, p. 74.

The discovery of insulin has made possible successful operation of a larger number of diabetic cataracts. The insulin treatment should be continued until cicatrization is complete. In young subjects it is best not to resort to operation hastily, as the insulin treatment may cause resorption of the cataract. In the discussion of the paper warning was stressed against unnecessary trauma, including iridectomy, especially preparatory, a small peripheral opening in the iris being suggested, and intracapsular extraction was favored to avoid the irritation from remnant of capsule and lens. J. B. Thomas.

Burky, E. L., Woods, A. C., and Woodhall, M. B. **Organ-specific properties and antigenic power in homologous species of alpha crystallin.** Arch. of Ophth., 1933, v. 9, pp. 446-449.

Alpha crystallin was found to be organ specific in all species, present in the whole lens extract, and not a product of chemical manipulation. Beta and gamma crystallin together were found to be inert in the homologous species, and when combined with alpha crystallin to inhibit the antigenic properties of the latter under comparable circumstances.

M. H. Post.

Foster, J., and Jackson, A. S. **Aphakic stereoscopic vision, with a note on the synoptophore.** Brit. Jour. Ophth., 1933, v. 17, Feb., p. 98.

Is stereoscopic vision obtained after bilateral lens extraction? The author gives a table showing the results of tests on ten patients with Worth's "four-light test", the Maddox rod, and the synoptophore. Three had good stereoscopic vision with prisms, one simultaneous perception with prisms, one intractable diplopia. The conclusion is that if glasses are fitted with sufficient care it is worth while to remove a second cataract so as to obtain stereoscopic vision if possible. D. F. Harbridge.

Hornback, E. T. **The inheritance of cataract in man, pedigree and interpretation.** Jour. Morphology, v. 54, no. 2, March 5, 1933.

From a mating of first cousins, the female having cataract, 33 out of 138 individuals in four generations had cataract (23.8 percent). Omitting the last generation and other more or less unknown members, 29 were known to be unaffected, 30 affected; i.e., 50.8 percent had cataract. The literature and the present pedigree indicated that cataract is inherited as an autosomal dominant, but that in some cases its occurrence partly depends upon nutritional and endocrine disturbances.

Lawrence T. Post.

Raia, V. L. **The progress of intracapsular extraction of cataract in recent years.** Ann. di Ottal., 1932, v. 60, Sept., p. 687.

In the opinion of the author, expression of the lens after the removal of anterior capsule had been so satisfactory that the intracapsular operation, hazardous in the hands of the inexpert, had not been considered necessary. It has therefore not been so popular in Italy as in parts of the United States.

Park Lewis.

10. RETINA AND VITREOUS

Coppez, L. **The pyrometric electrode and its application to the treatment of detachment of the retina by transscleral diathermocoagulation.** Bull. Soc. Belge d'Opht., 1932, no. 65, p. 45.

This instrument measures the temperature at the spot and at the moment of coagulation, an important addition to the technique of Larsson or of Meller in performing diathermo-coagulation. The current passes through the sclera, leaving the latter intact but cauterizing the underlying choroid. The instrument is based on the principle of the electric thermometer. In experiments on the hare Coppez found that an application

at 80 degrees centigrade produced a strong reaction with perfect chorioretinal adhesion. One application at 90 degrees centigrade produced extensive incurable vitreous disturbance and application at 70 degrees was ineffective. It is interesting to note that at 80 degrees the scleral eschar was slightly grayish, at 90 degrees it was brown, and at 70 degrees there was no change. It is precisely this grayish tint that Larsson fixed upon as the most favorable in obtaining an adhesive eschar of the chorioretinal plane without disorders of the vitreous. Transscleral diathermy has the great advantage of acting on the choroid alone.

J. B. Thomas.

James, G. R. **Degeneration of ganglion cell following axonal injury.** Arch. of Ophth., 1933, v. 9, pp. 338-343.

Experimental work was done on rabbits to determine the ultimate outcome of chromatolysis in the ganglion cells of the retina, following mainly the technique of Birch-Hirschfeld. The optic nerve was severed 3 mm. behind the globe. The second eye was used as a control. At various lengths of time afterwards the animal was killed by a blow in the back of the neck. Chromatolysis appeared first in the central portion of the cell, the Nissl bodies faded and became granular, the cytoplasm swelled, the Nissl material faded further, and the cell disappeared. The greatest degeneration took place between the tenth and twentieth days, but an occasional cell remained as long as 120 days after the injury.

M. H. Post.

Rubbrecht, R. **A new contribution to the treatment of detached retina.** Bull. Soc. Belge d'Opht., 1932, no. 65, p. 41.

In a case of extensive retinal detachment of two weeks standing, in a myope of 20.00 D., three incisions about 2 mm. long were made in the sclera over the area of the detachment, care being taken not to penetrate the choroid. By means of a small foreign-body curette a droplet of jequiritol III was deposited on the choroid at each incision. Then the choroid was perforated with a fine needle in four places, allowing the subretinal fluid to escape. The operation was followed by severe pain for several days, with intense orbital reaction and considerable exophthalmos; but the final result was satisfactory, by the end of nine months the patient regained a visual acuity of 1/8 after having been almost totally blind. The main interest in the case rests in the large area of chorioretinitis produced by application of the jequiritol. J. B. Thomas.

Vaucleroy, de. **Embolism of the central artery of the retina cured by one injection of acetylcholine.** Bull. Soc. Belge d'Opht., 1932, no. 65, p. 27.

A man of fifty-five years consulted the writer two hours after onset of sudden blindness in the right eye. The appearance was that of embolism of the central artery of the retina. The treatment consisted of an intramuscular injection of 20 cg. of acetylcholine, massage of the globe, and two leeches over the right mastoid process. By the third day the fundus appeared normal and vision was 0.6. After twenty days vision was 0.9. Discussion developed the opinion that the case was one of spasm and not embolism. J. B. Thomas.

Wibo. **Gonin's operation in retinal detachment with multiple tears.** Bull. Soc. Belge d'Opht., 1932, no. 65, p. 37.

Wibo considers it desirable to perform a double or even a triple thermopuncture at the same operation when the tears are near one another and their coexistence seems to result from circulatory trouble localized in one sector of the choroid and retina. If the tears are located in quite different regions of the retina, thermopuncture repeated at intervals is justifiable.

J. B. Thomas.

Wilmer, W. H., Pierce, H. F., and Friedenwald, J. S. **The light streaks on the retinal blood vessels.** Arch. of Ophth., 1933, v. 9, pp. 368-380.

This interesting subject has been studied for many years. The authors demonstrate that the reflex must arise at the surface separating the retina and adventitia and also at that separating

the media and intima and the intima and plasma. By the use of glass tubes filled with various substances and immersed in various media, comparable light streaks were artificially produced.

M. H. Post.

11. OPTIC NERVE AND TOXIC AMBLYOPIAS

Brandes. **Preliminary note on a case of optic neuritis of endocrine origin.** Bull. de la Soc. Belge d'Opht., 1932, no. 65, p. 78.

The patient was a woman with complete atrophy of the left optic nerve and beginning atrophy of the right, with vision 0.25. Menstruation had begun at seventeen years and she had menstruated only three times in her life. Radiography was negative and the visual fields normal. The author ventures a diagnosis of hypophyseal defect causing ovarian deficiency and amenorrhea, and accompanied by basal pressure symptoms and optic atrophy. In discussion Coppez recommended radiotherapy and transfrontal exploration of the region of the hypophysis.

J. B. Thomas.

Fisher, J. A., and Baeseman, R. W. **Retrobulbar neuritis secondary to posterior ethmoid and sphenoid sinus disease.** Jour. Med. Soc. of New Jersey, 1932, v. 29, Nov., p. 861.

The authors report two cases of retrobulbar neuritis occurring in young people who regained their vision and fields after exenteration of the ethmoid and sphenoid sinuses. Care must be taken to exclude such conditions as multiple sclerosis and Leber's disease. (Discussion.) M. E. Marcove.

Sawyer, G. M. **Quinine amblyopia or retrobulbar neuritis consequent to the giving of optochin base.** Jour. Iowa State Med. Soc., 1933, v. 23, Jan., p. 25.

In a young woman who developed bronchopneumonia after an attack of influenza, optochin base was started on the third day, four grains every five hours. After the eighth dose, the patient complained of blurred vision and difficulty in hearing. In two days there was no light perception, and the pupils were dilated and fixed. There was marked ischemia of the retina and of the nerve head. Two days later vision began to improve, and it reached 20/40 in each eye three weeks after the onset of the disease. The form field was contracted from fifteen to thirty degrees, the color fields markedly contracted for blue and green. Treatment consisted of potassium iodide and pilocarpin internally; and, locally, frequent hot compresses and instillations of dionin and eserin.

M. E. Marcove.

Zanen, J. **Optic atrophy, enlarged sella turcica, hypercalcemia accompanying an "encephalotypy" (Crouzon's disease).** Bull. de la Soc. Belge d'Opht., 1932, no. 65, p. 114.

The author reports a typical case of the malady first described by Crouzon in 1912. The classic triad of this syndrome is frontal protuberance, ocular disturbances, and facial malformations, to which Crouzon adds the familial and hereditary character. Zanen gives the name "encephalotypy" to the cerebriform appearance of radiograms of the skull, which is so thin in portions as to have the appearance of revealing the convolutions of the brain. He notes in his case the presence of hypercalcemia, the importance of which he thinks may be great, and he states that he has not seen it described in the literature.

J. B. Thomas.

12. VISUAL TRACTS AND CENTERS

Butler, T. H. **Scotomata in migrainous subjects.** Brit. Jour. Ophth., 1933, v. 17, Feb., p. 83.

The two cases reported both had definite scotomata which were accurately mapped. The first patient, a male aged forty-seven years, had been rendered unconscious by monoxide gas one month before observation. The right field showed general form contraction with a relative scotoma on the nasal side opposite and about the same size as the blind spot. In the second patient, a female aged forty-five years, both fields showed slight form contraction, with hemianopic crescentic scotoma ab-

solute in the right and partly relative in the left. Apparently there were no changes in the region of the sella. Examination some four months later showed the field defects had disappeared. The author thinks some types of migraine due to a transitory tumefaction of the pituitary body, and puts the latter case in this group.

D. F. Harbridge.

François, Jules. **Sellar tumor, first treated by radiotherapy, later by surgical intervention.** Bull. Soc. Belge d'Opht., 1932, no. 65, p. 103.

The patient, a man of fifty-seven years, consulted the writer about six months after vision had begun to fail. It had fallen to counting of fingers at 25 cm. with right eye and hand movement with the left. Symptoms included temporal pallor of the optic discs, central scotoma for all colors, bitemporal hemianopsia, violent frontal headaches for four months, vertigo, vomiting, constipation, impotence, loss of hair of beard and pubis, acromegaly in some degree, yellowish skin, and asthenia. Cranial radiograms showed a ballooned sella turcica with absence of the posterior clinoid processes and only partial visibility of the anterior clinoids. A tentative diagnosis of chromophobe adenoma of the hypophysis was made. Operation was refused. Radiotherapy was followed in about one month by slight improvement of vision of the right eye, no improvement in the visual fields, marked relief of headaches and vertigo. Later the patient agreed to operation. Under local anesthesia and by the intradural route the tumor, "macroscopically an adenoma", was removed by ablation and curettement. Symptoms referable to the third ventricle soon developed and the patient died eleven days after the operation. The tumor proved to be an epithelioma, completely filling the third ventricle, and extending along the basilar groove. The epithelioma was composed of small basophile cells. There were no symptoms suggesting involvement of the third ventricle —no somnolence, no polyuria, polydipsia or glycosuria. J. B. Thomas.

Shimkin, N. **Contribution to the symptomatology and the diagnosis of tumors of the stem of the pituitary gland.** Ann. d'Ocul., 1933, v. 170, Feb., pp. 127-151.

The first case is an example of the pure chiasmal syndrome with lowered vision, optic atrophy, and bitemporal hemianopsia. In the second case an endocrine disturbance dominated the picture, while in the eyes there was only papillary stasis. The third case combined the features of the first two. Of tumors in this region, the cysts of the pouch of Rathke are most easily diagnosed. They may be suprasellar or intrasellar in location, provoke endocrine disturbances by pressure on the pituitary gland, and sometimes regress spontaneously.

H. Rommel Hildreth.

Tokay, L. **Blindness with bilateral microgyria of the calcarine region.** Graefe's Arch., 1933, v. 129, p. 426.

A man of twenty years old, from a family of alcoholics and delivered with forceps, had been blind since infancy and epileptic since the age of five years. At autopsy the right hemisphere was smaller than the left. The posterior third of the left upper frontal gyrus as well as the posterior third of right first frontal gyrus were microgyric, and the calcarine area on each side showed microgyria. While the optic nerves were normal, the lateral geniculate bodies were replaced by glial tissue, and there was destruction of the corresponding layers of the quadrigeminal bodies and degeneration of the optic radiations.

H. D. Lamb.

13. EYEBALL AND ORBIT

Friedenwald, J. S. **Orbital myositis and choked disc in exophthalmic goiter.** Annals of Surgery, 1932, v. 46, Dec., p. 995.

A man of fifty-four years developed a bilateral proptosis, with orbital cellulitis on the left side. This subsided, but the exophthalmos became more marked. Basal metabolism was +60. Three days after admission, the patient became delirious and his heart irregular. Two days

later he developed bilateral acute glaucoma. Anterior paracentesis relieved the glaucoma symptoms, but he died in a few days, eight months after onset of his symptoms. Postmortem examination revealed marked atrophy of all the extraocular muscles. Many fibers were replaced by fat. There were focal accumulations of lymphocytes in the interstitial tissue. The author believes this case to be similar to that reported by Naffziger, except that in the latter the progressive exophthalmos followed thyroidectomy. M. E. Marcove.

Papagno, M. **Spontaneous pulsating exophthalmos from an arteriovenous aneurism of the internal carotid and the cavernous sinus.** Ann. di Ottal., 1932, v. 60, Sept., p. 671.

The condition arose spontaneously in a cardiopathic woman. Operative treatment was refused, and after a few days of pressure applied over the carotid artery the patient went home for systemic treatment.

There was probably a slight carotid aneurism. (Bibliography.)

Park Lewis.

Porter, C. T. **The etiology and treatment of orbital infection.** Ann. Otol., Rhinol., and Laryngol., 1932, v. 61, Dec., p. 1136.

A large majority of orbital infections are due to acute infections of nasal accessory sinuses or acute flare-up of preexisting chronic sinus disease. Next in importance as causative factors are tooth infections. Real orbital abscess is comparatively rare. It is quite likely to be due to too early surgical interference in the orbit. In very young children orbital infection is exceedingly dangerous. Three case reports are given. M. E. Marcove.

Terson, A. **Technique of enucleations with neurectomy.** Ann. d'Ocul., 1933, v. 170, Feb., pp. 151-160.

This article covers a variety of methods of enucleation and is not suitable for abstraction.

H. Rommel Hildreth.

Weekers. **Treatment of orbital varicocele. The comparative effects of radium and of sclerosing injections.** Bull. de la Soc. Belge d'Opht., 1932, no. 65, p. 81.

This rare condition offers great difficulties of differential diagnosis. The author reports a case in which he tried successively radium and then a sclerosing injection into the varicose mass. The radium failed completely but a single sclerosing injection led to rapid cure which persists after four years. The solution consisted of 1.5 c.c. of chlorhydrate of quinine 2 gm., urethane 1 gm., in distilled water 15 gm., and was injected along the inferoexternal wall of the orbit to a depth of 3 cm. Obliteration of the vein is caused mainly by endothelial reaction, the cells becoming coated with fibrin which organizes into cicatrical tissue. A study made by Bensaude proved that in the treatment of hemorrhoids one obtained the same curative effect by injecting the sclerosing substances not directly into the lumen of the varices but into the connective tissue in their immediate vicinity.

J. B. Thomas.

14. EYELIDS AND LACRIMAL APPARATUS

Rosenstein, Maria. **Blepharochalasis with struma and thickened lips.** Wien. klin. Woch., 1932, v. 45, Aug. 12, p. 1017.

Bilateral edema of the eyelids, lips and thickening of the neck developed one month after an attack of influenza. Three months later the menses appeared for the first time, and they occurred irregularly thereafter. The condition is thought to be due to disturbance of the internal secretory glands, especially the ovaries and thyroid, and similar cases that have been reported are mentioned. (2 illustrations.)

Beulah Cushman.

Weekers. **Reestablishment of permeability of the lacrimal passages.** Bull. Soc. Belge d'Opht., 1932, no. 65, p. 65.

The writer uses surgical diathermy through a sound coated with insulating varnish except at its extremity, so as to apply a strong current to the desired area in the nasal canal. Block anesthesia of both the infraorbital nerve and

the nasal branch is advised. A Weber knife is passed as far as the nasal canal, followed by the sound. The strength and application of the current are described in careful detail. The inflammatory reaction is moderate and the lacrimal passages remain obstructed until after ten days the plug of coagulated material is eliminated. Nine patients had been treated by this method, some of the cases complicated by suppuration. The scars produced by surgical diathermy are especially smooth, supple, and but slightly contracted.

J. B. Thomas.

15. TUMORS

Laricchia, F. **A clinico-histological contribution to lymphangioma of the bulbar conjunctiva.** Ann. di Ottal., 1932, v. 60, Sept., p. 662.

At the inner canthus of the right eye of a fifteen-year-old boy a growth had been slowly developing for several years. The neoplasm was dark red in color, elevated about 2 mm., and had a roughened warty surface. The caruncle was hypertrophied and red, the plica semilunaris four times its normal size and was of a dark gray color with marked pigmentation. Under x-ray treatment the neoplasm gradually disappeared. The pathology was thought to depend on congenital malformation of the lymphatics of the caruncle, with proliferation of the lymphatic endothelium at puberty. (Bibliography, plates.) Park Lewis.

Siegrist and Cramer. **Bilateral uveal cancer secondary to lung epithelioma.** Ann. d'Ocul., 1933, v. 170, Feb., pp. 116-126.

In a forty-five-year-old man the diagnosis was made during life; the primary tumor being proved by obtaining cancer cells in fluid taken by puncture from the pleural cavity.

H. Rommel Hildreth.

16. INJURIES

Argañaraz, R., and Sena, J. A. **Orbito-ocular changes in cranial fractures.** La Semana Medica, 1933, 40th year, March 9, p. 785.

After a rather extensive literary review of the subject, with many excellent illustrations, the authors recite briefly three cases.

Josuran, Karl. **Experimental findings on the action of the long-wave (non-penetrating) ultrared rays on the eyes of rabbits.** Graefe's Arch., 1933, v. 129, p. 353.

Observations showed that non-penetrating ultrared rays (wave-length greater than 3000 millimicra) could injure the eye only when employed in very high intensities, and even then caused only superficial burns of cornea and conjunctiva. H. D. Lamb.

Meding, C. B. **Foreign body in orbit. Foreign body in anterior chamber. Ulcus serpens.** Arch. of Ophth., 1933, v. 9, pp. 407-410.

In the first case, a brass ring was found in the orbit. In the second case, a stone particle was found attached to the iris after a hunting expedition. In the third case, death occurred after progressive ulcus serpens, which at autopsy was shown to have been metastatic in type. M. H. Post.

Wagner, Hans. **Experimental observations on the effects of short-wave ultrared rays upon the living cornea, with slitlamp findings in conjunctiva, cornea, and iris of the glass-blower.** Graefe's Arch., 1933, v. 129, p. 339.

In both man and animals the short-wave ultrared rays did not injure the cornea, even when they reached a temperature between 200 and 300°. Slit-lamp examinations showed no resulting changes in conjunctiva, cornea, or iris. Thus ultrared rays may produce opacities in the lens without injury to the coverings of the eye. H. D. Lamb.

NEWS ITEMS

News items in this issue were received from Drs. C. A. Clapp, Baltimore; F. C. Cordes, San Francisco; and Charles P. Small, Chicago. News items should reach **Dr. Melville Black, 424 Metropolitan Building, Denver,** by the twelfth of the month.

Deaths

Dr. Joseph Stanley Lichtenberg, Kansas City, Missouri; aged sixty-three years, died, April 2nd, of gas bacillus septicemia following a prostatectomy.

Dr. George Slocum, Ann Arbor, Michigan, aged sixty-seven years, died suddenly, March 24th, of heart disease.

Dr. William E. Shackleton, Cleveland, Ohio; aged sixty-three years, died, March 27th, of heart disease.

Dr. Charles A. Cramton, St. Johnsbury, Vermont; aged sixty-one years, died suddenly, March 21st.

Miscellaneous

The National Society for the Prevention of Blindness announces that special training for teachers of children with seriously defective eyesight will be offered this summer at Western Reserve University, Cleveland; University of Chicago; and Teachers College, Columbia University, New York. "Sight-saving" classes are now a part of the educational system in 119 communities in the United States. Further information may be had from the Society, 450 Seventh avenue, New York.

Dr. Frederic C. Cordes of San Francisco, who has been making a collection of ophthalmoscopes for the University of California Medical School Museum, reports that this collection now numbers forty-eight instruments and includes a replica of Helmholz's ophthalmoscope, a Jaeger, and other early models. It also includes a Sichels ophthalmoscope, which was one of the first attempts at binocular ophthalmoscopy. This will be exhibited at the meeting of the Pacific Coast Oto-Ophthalmological Society in June.

Madrid, Spain, April 18.—Seven American ophthalmologists represented the United States at the Annual Meeting of the International Association for Prevention of Blindness in Madrid, Spain, April 18, 1933.

Dr. Park Lewis, of Buffalo, New York, who is vice-president of both the International Association and the American National Society for the Prevention of Blindness, headed the delegation from the United States which included: Dr. Le Grand H. Hardy of New York City, and Dr. E. V. L. Brown of Chicago, members of the Advisory Committee of the American National Society; Dr. M. Davidson of the New York State Department of Labor; Dr. Manuel U. Troncoso and Dr. Ramon Castroviejo of New York City; and Dr. Frederick Bentley of Seattle, Washington.

The principal topic of general discussion was "A plan of international classification of the causes of blindness." The American delegates presented the results of research during the past several years by The Committee on Statistics of the Blind, sponsored by the American Foundation for the Blind and the American National Society for the Prevention of Blindness.

The growth of the International Association since its establishment by the representatives of 28 countries who met at The Hague on September 14, 1929, was reviewed by Professor F. de Lapersonne, of the University of Paris, president of the Association. National committees devoted to prevention of blindness and conservation of vision, sponsored by the International Association, are now functioning in Argentine, Belgium, Brazil, China, Germany, Hungary, Italy, Japan, Mexico, Poland, Portugal, Spain and Switzerland.

Two of the principal directions in which the Association is working, according to Professor de Lapersonne, are toward the prevention of industrial eye accidents and the establishment of "sight-conservation classes" for school children with seriously defective vision.

Personals

Dr. William Holland Wilmer has recently been elected a member of the Hungarian Ophthalmological Society.

Dr. George Tobey of Boston will be the guest speaker at the meeting of the Pacific Coast Oto-Ophthalmological Society in San Francisco in June.

Dr. Edward H. Cary, Dallas, was guest of honor at a dinner given by the Medical Club of Philadelphia at the Bellevue-Stratford Hotel, April 21.

Dr. John O. McReynolds, Dallas, was elected president of the Pan-American Medical Association at its recent meeting in Dallas, Texas.

Dr. Harry S. Gradle, Chicago, gave an address on the "Etiology of ocular disease," at the meeting of the Illinois State Medical Society at Peoria in May.

Dr. Sanford R. Gifford, Chicago, recently conducted a clinic and lectured on glaucoma as the guest of the Eye, Ear, Nose and Throat Academy of Dallas, Texas.

Dr. Casey Wood is now in Kandy, Ceylon, making, for several American colleges, a collection of materia medica, surgical instruments, and other items illustrating medical practice in South India from the fifteenth to the eighteenth centuries. Dr. Wood and his family expect to spend the coming autumn and winter in the Tyrol and Rome.

Dr. John Green was recently elected chairman of the eye, ear, nose and throat section of the Missouri State Medical Society.

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